

JUNIOR MECHANICS AND MODEL **AIRPLANE** NEWS



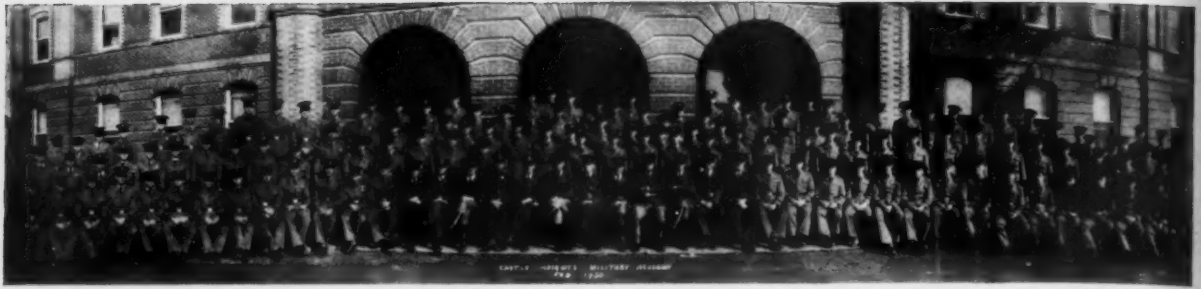
AUGUST
 1933



PRISONER OF THE AIR
 An Epic of the Marine Corps
 By LIEUT. H. B. MILLER

Continuing: GLIDING and SOARING
 and a SPECIAL COURSE in
 AIR NAVIGATION

SIZE PLANE: D. H. C. M. H. 25. Flying Model and a Real Smoke Screen Model



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Bernarr Macfadden

The man whose vast resources and enthusiasm combine with the traditions and facilities of Castle Heights to make it one of the nation's outstanding schools.

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Vol. III

No. 2

JUNIOR MECHANICS and MODEL AIRPLANE NEWS

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In Our Next Issue

Northrop startled America with his "Flying Wing"—and now MODEL AIRPLANE NEWS has secured from Prof. T. N. de Bobrovsky, the noted aeronautical expert, plans and constructional data for a flying model of this amazing airplane.

—O—

Also there are plans for a flying model of a Bellanca seaplane. The novelty of construction of this model will intrigue you.

—O—

Then, for those readers whose interest is centered in the forthcoming international yacht races for the America's Cup, there are plans for a beautiful racing yacht model.

—O—

Our next issue, of course, contains more articles on *Gliding and Soaring*, and also on *Aerial Navigation*.

In addition there is a story on Wind Tunnels by Stuart Palmer, in which everything you want to know about this aeronautical device is outlined for you in understandable language.

Furthermore, there is starting a wonderful new serial of the air, in which Larry Price, a poor farm boy, proves his gratitude by saving the life of his flying teacher. It's a great story.

—O—

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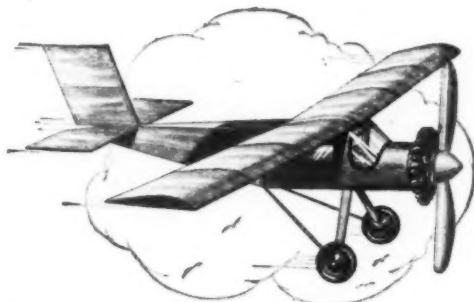
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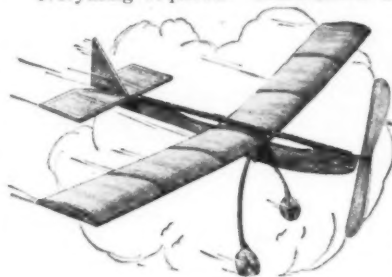
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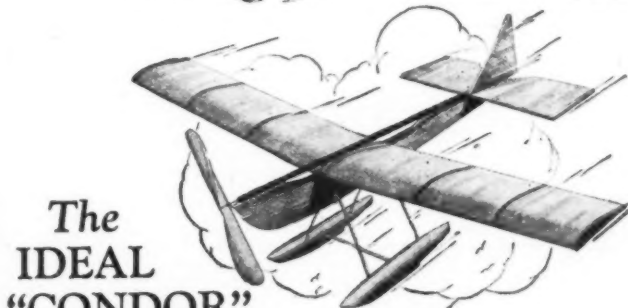
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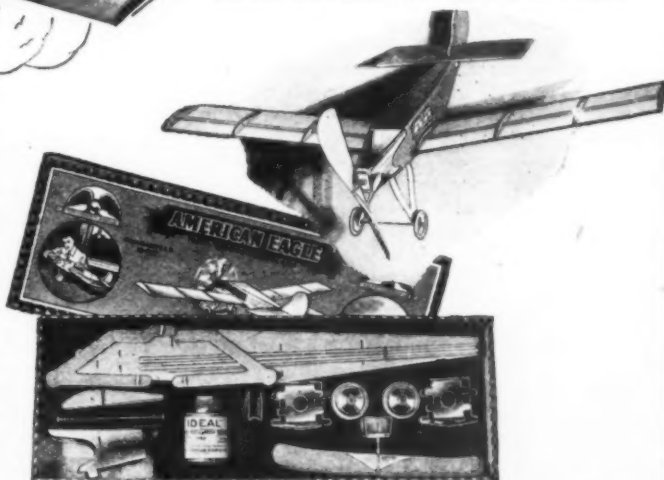
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Prisoner of the AIR



B LIMP," otherwise known as Lieutenant Wil-

liam Ryan, U. S.

M. C., side-slipped his Corsair into the pocket-edition field at San Ramon, a field which had been laboriously carved from living jungle by sweating marines only a few months before.

It was a cagey field. As Blimp slid over the last jungle tree he felt cold perspiration breaking out on his upper lip. He fought down the wild moment of panic he had come to dread. Since his detachment had come to San Ramon three weeks before, this nightmare moment had occurred more and more frequently. It was beginning to get Blimp worried—in the language of his brother flyers—"goaty."

The moment passed—Blimp straightened her out and dropped his tail. He wondered if Sergeant Capper in the cockpit behind him had noticed anything. For the most part, landing at San Ramon was a matter of squashing a plane in. Landing gears were cracked up every day and the Supply Officer was kept ordering new ones at a lively rate.

Blimp's mechanics ran out to meet him. Tropical sun had turned the men almost the color of their monkey suits. Save for Blimp's very blue eyes there was nothing to distinguish his face from his helmet and flying jacket. He could thank Sandino for a coat of tan he would probably never lose as long as he lived.

Blimp jumped down from the cockpit and went around to examine the tail of his ship. Sergeant Capper followed him. As he had suspected, there were the

The Author of "The Air Goin' Navy" Gives Another Peep into the Life of Uncle Sam's Airmen

marks of two bullets well down towards the end. One had missed his right rudder wire by inches.

"Close shave, sir," said Capper, nonchalantly.

Blimp nodded absently. He'd come back from a bandit hunt with bullets in his fuselage too many times to get excited about it. It was all part of the day's work, though of late he had noticed that the Nicaraguan bandits were coming closer to vital spots on the plane. Practice makes perfect, and so far they had had over a year to practice on marine Corsairs.

He gave the mechanics a few instructions. He conferred with Capper about their guns, and walked over to Headquarters, a dingy adobe house, to put in his report. The sun beat down viciously on his back and shoulders making his flying clothes heavy and unbearable. He longed for the comparative coolness of his own tent.

"What luck?" asked Captain Allby eagerly.

NOT much," admitted Blimp ruefully. "They're over in those foothills back of Requita, but it's like trying to find an emergency landing field in this country."

"Blimp, we've got to do something—and do it in a hurry," said the older officer. "If we can't bomb those rats out of their nests on the hillside, they'll cut off our supply train through to Bodega."

Blimp had been the last one of the squadron in from the afternoon patrol. Cassidy, Andrews and Tuttle, the other three pilots at San Ramon were out in front

An Epic of the Marine Corps in Nicaragua

By
Lieut. H. B. MILLER

of Headquarters talking over the events of the day. Captain Allby took advantage of the fact to call them in and hold an informal conference on the question of protecting the supply train.

"The idea is for us to clear these small fry out of the way so that detachments can be sent farther north."

Captain Allby had a ready tongue and a good vocabulary. When he got through there was no doubt in anyone's mind as to what he wanted. "We've got to clear them out by the end of this week—smoke 'em out—or Headquarters will jump us in a way that won't be funny."

He paused to let this significant fact sink in before he went on with instructions. "Tomorrow I want each one of you to go out on your own again. Take a different direction—and one of you come home with no bombs and no cartridges!"

After the conference, Blimp went to his own tent and sat down on the edge of his cot, resting his head in his hands. The terror was pursuing him again. He was dog tired. But there was no use trying to sleep. He knew from experience that he would only fly the harder.

Lately, he had been dog-fighting even in his sleep—whirling and twisting miles above a jungle in which there was no place to land. And oftener, too, he had been having that horrible nightmare of spinning down to earth in a machine that was out of control. Of course, he always woke up just before the crash came. He'd find himself sitting up in bed in a cold sweat, gasping for breath.

It is not uncommon for pilots to find themselves flying in their sleep. Or to dream of crashing, occasionally. But lately Blimp Ryan had been getting these horrors while wide awake in broad daylight. Since they had come to San Ramon landing his Corsair had been torture for him. For a split second each time he would lose his nerve. Thinking about it when he was on the ground brought the whole nightmare sensation back again. Blimp was waging a lonely fight against surrendering to this terror.

At first he blamed it on the heat. He had had six months of Nicaragua at its hottest. The sun had blistered the paint off their planes and worn everyone's nerves to the breaking point. Heat combined with the flies and the fairly accurate shots of Sandino's men.

Deep in his heart, Blimp knew that his fear of crashing was not entirely due to the climate of Nicaragua or the bullets of

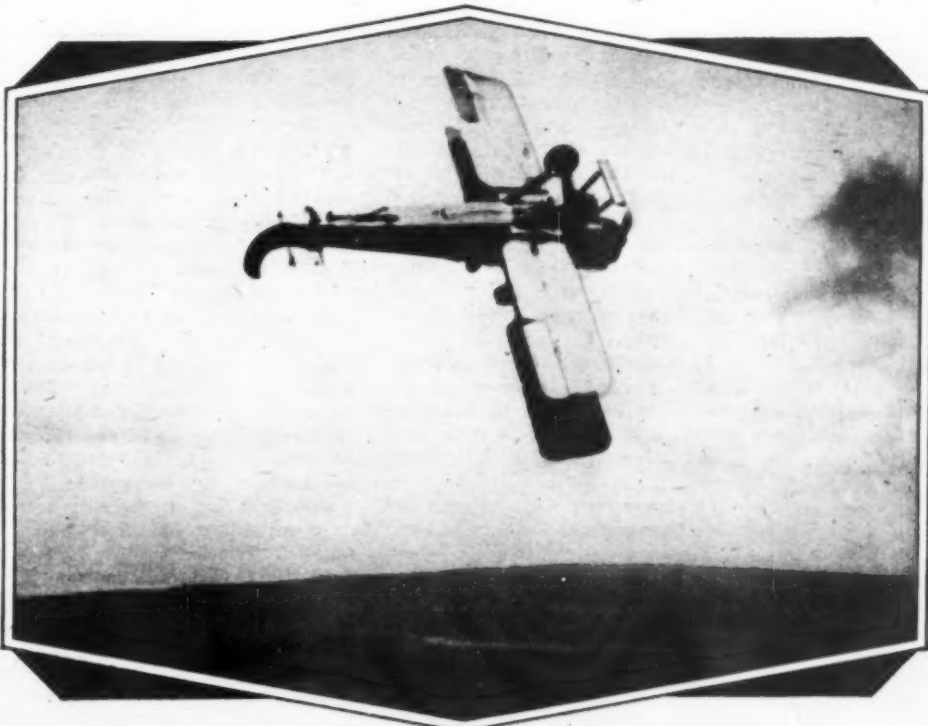
Sandino's ruffians. It went farther back than that. Back to his student days at Pensacola, which were not so far behind him.

The first part of his training had gone well. He'd loved flying as much as he had expected he would. Then came the shift from the heavier stable sea planes to the more tricky and faster land planes.

One day he had gone up with Jim Rawdon, a good buddy of his, and also a student. They had set out to fire on a ground strip—a white cloth target set up on a frame in the Bay. It was first time either of them had done any gunnery work and consequently they were both a bit edgy. The plane responded more quickly than the other ships he had flown. By the time they had been out a half hour he felt that his spine was tied up in cast iron knots and the perspiration was rolling down his face.

RULES demanded that they fly over the target at an altitude of five hundred feet. The secret of getting hits with the free machine gun in the rear cockpit was to fly along at nearly a stalling speed. To add more hits a slow stalling turn was made as the target was passed. This gave a comparatively long period in which the gunner moved very slowly past the target. However, it was dangerous, for a spin from this altitude is dangerous to a veteran airman, to say nothing of a student.

Finally, Jim in the forward cockpit signalled to him that there was one more pan of ammunition. Blimp



On the top of the loop, Blimp half-rolled the ship

located his target and flew for it with his nose pulled high. As the ship passed over the target, Jim opened up with his Lewis gun. Determined to give his friend the best possible opportunity to get in his shots, Blimp pulled his nose even higher. Perhaps he would have noticed the lack of "song" in his wires had he not been occupied with watching Jim. He began the usual turn when suddenly the ship trembled. The nose dropped off quickly to the right and the plane was in the clutches of the dangerous spin at an irrecoverable altitude!

There was insufficient altitude to jump and take the one sure path to safety. Better to cut the switch and pull back on the stick in order to make the spin as flat as possible!

The earth came up—a big flat hand! He remembered ducking into the cockpit. Blackness. When he came to he found that Jim had been killed. He himself was only bruised and had sustained a few minor cuts. Though, if the crash boat hadn't come at once he would surely have drowned.

For a time Blimp was afraid they weren't going to give him his wings. He knew that they were watching him carefully. One more crack-up of the slightest kind and they would bust him out. Luck was with him—and the results of his own hard work. Within two months after the crash he was on his way to Nicaragua full of joyful anticipation. It would be good sport flying around taking pot shots at bandits.

Excitement and change blotted out the memory of the crash. Then, as he found that bandit-hunting was pretty routine work after all, those moments of terror when he had whirled down to earth, the crash, its tragic result, had come back to him. During steaming nights in the jungle when he couldn't sleep, they recurred vividly, horribly.

Fortunately, nobody in the squadron knew of his secret fear. They rated him a pretty good flyer, Blimp felt. If he could only hold on a little while longer, fight it down. There were times when he almost wished he would stop a Sandino bullet.

But never for long. In spite of the terror that was riding him, Blimp was no coward. After every one of his goaty spells, he would determine to hang on. Maybe these jeebies would go away. Maybe if he held out until the rains came, he could take a little leave and go up to the States.

Early next morning the planes were warmed up. The squadron was on its toes. To-day was the day to come home with the bacon! To clean out the bandits infesting the road to Bodega, threatening the precious artery of the marine communication system.

"Do your stuff, boys," admonished Captain Allby.

As Blimp said good-bye to him and set off across the landing field to his plane he was inclined to laugh at all thought of crash nightmares. It was early enough to be still fairly cool. The sound of his motor idling along was music in his ears. Capper's leathery face

and hearty grin was good to see. It was a pretty good world with a bandit hunt after every breakfast!

He made a good take-off with his motor purring nicely. For a time he kept with Andrews and Cassidy. Then they parted, headed in various directions on private hunches of their own. Blimp headed his Corsair for Requita. He had an idea of his own as to where the encampment of dusky ruffians might be.

Requita nestled at the foot of the hills. Hills which grew to mountains; steep, wild, jungle-covered, towering over the little settlement and the road. As far as the marines could learn from their own scouts and from friendly natives, these allies of Sandino's were hidden away in the dense jungle directly behind the town. A fine position from which to harry the road to Bodega. These raids seldom netted the bandits any booty, but they were irritating—not unlike an attack by an army of tropical ants. Moreover, these ants could sting!

To the right of Requita a swift creek cascaded its way down between two of the steepest mountains. It was

not navigable because of the many waterfalls, and to all appearances the banks were so steep that it would have been impossible to follow up the creek. But Blimp had a hunch that the stream might open up further back in the hills, providing a ready-made hiding place for the bandits.

It was not a promising place to fly. In order to observe anything that might be moving in the matted jungle and along the creek bed, it was necessary to be down about twenty-five hundred feet. That drew Blimp down into the jaws of the mountains and well within gun range of the rebels. As far as he could tell this unexplored country didn't offer landing space for a jack-rabbit. It was a case of trusting to one's luck—and to the good old Wasp engine to turn out its sixteen hundred revolutions per minute without faltering.

BLIMP indicated to Capper what they were going to do. The Sergeant's grin stretched from one edge of his helmet to the other. Capper was a good man. He had fought pirates in China, had chased the Boches in France, and inaction of any sort bored him completely. He was fond of anything that might result in a good scrap.

Blimp set his teeth and plunged on through the gorge. He could feel the down-drafts pulling at him. Since flying in Nicaragua he had become so used to ordinary bumps that he didn't pay much attention to them any more. But this canyon of Requita treated him to a few that reminded him of the rides on a concession in an amusement park. His ship fairly bounced as she made her labored way forward.

Strive as he might, Blimp could not penetrate the deep green screen below him. The jungle held her secrets. Finally, however, he was rewarded with the fact that his hunch had not been altogether wrong. The canyon *did* widen out—the creek became quieter, and finally he found that he was over a small valley.

Then Blimp saw a sight which made his heart thump and his hand shake with excitement on the control stick! The left side of the valley had been cleared. It must have been done by men—and recently. Otherwise the jungle would have claimed (Continued on page 50)





A three-quarters rear view of the finished model

HOW TO BUILD A D. H. "Moth" Bi-plane

A Natty 2 ft. Flying Scale Model of a Popular Plane

HERE is another famous light sport plane of English make, the D. H. Gypsy Moth, which was designed by Capt. G. de Havilland. Among the planes produced by this aeronautics pioneer the most popular is the Gypsy Moth. It is powered with an 85-100 h. p. Wright Gypsy engine and is truly a remarkable machine in performance and speed. The present model was built by Jesse Davidson.

Before starting construction, make sure that all materials listed are at hand and read the directions carefully.

FUSELAGE

This is constructed in two parts. The nose is made separate, although not detachable. For the fuselage, use 1/8" square balsa. Model making pins are used to retain the right shape, taking care and time when doing this. Formers 7, 8, 9, 10, 11, 12 and 13 are cut from 1/16" thick balsa and glued in position. For stringers on the top of the fuselage 1/16" balsa is used. Construct according to plans and specifications.

WINGS

You will need 1/16" balsa for the ribs. First cut out the thirty-two wing ribs. Make the holes for the center spar. Use 3/16" square balsa for the leading edge, 1/8" x 1/4" balsa for the center spans and 1/16" square bamboo for the trailing edge. Make them as shown in drawing.

It will be necessary to make four half wings; two right and two left. The center section is easily made from the drawings.

TAIL ASSEMBLY

The Moth has nicely shaped control surfaces. These are built from 1/16" balsa used for elevator and rudder ribs. To give the curved effects, use 1/16" square bamboo.

Use glue sparingly. Cover and set aside to dry properly.

Necessary Material

4 strips	3/16" x 3/16" x 12"	balsa	leading edge
4 strips	1/8" x 1/4" x 12"	balsa	center spar
3 strips		bamboo	trailing edges, etc.
2 strips	1/8" x 1/4" x 18"	balsa	struts, etc.
2 strips	1/16" x 3" x 18"	balsa	ribs, tail, rudder
1 piece	1/3" x 2" x 6"	balsa veneer	cockpits
5 strips	1/16" x 1/16" x 12"	balsa	stringers
1 strip	1/16" x 3" x 12"	balsa	nose formers
6 strips	1/8" x 1/8" x 18"	balsa	fuselage longerons
1 strip	1/8" x 1/4" x 18"	spruce	motor stick
1 piece	1/8" x 1/2" x 12"	balsa	landing gear struts
1 large		thrust bearing	
1 foot	No. 14	wire	
1 pair		Forest wheels	
6		copper washers	
4		wheel bearings	
1 package		model making pins	
1	1-1/4" x 3/4" x 10"	propeller block	
3 sheets		Japanese tissue	
1	2 ounce bottle	banana oil	
1	2 ounce bottle	dope	
1	2 ounce can	Unitite cement	
12 feet	1/8" flat	rubber	
1 piece	3" x 3"	celluloid	

See Plans on Pages 8 to 14

COCKPITS

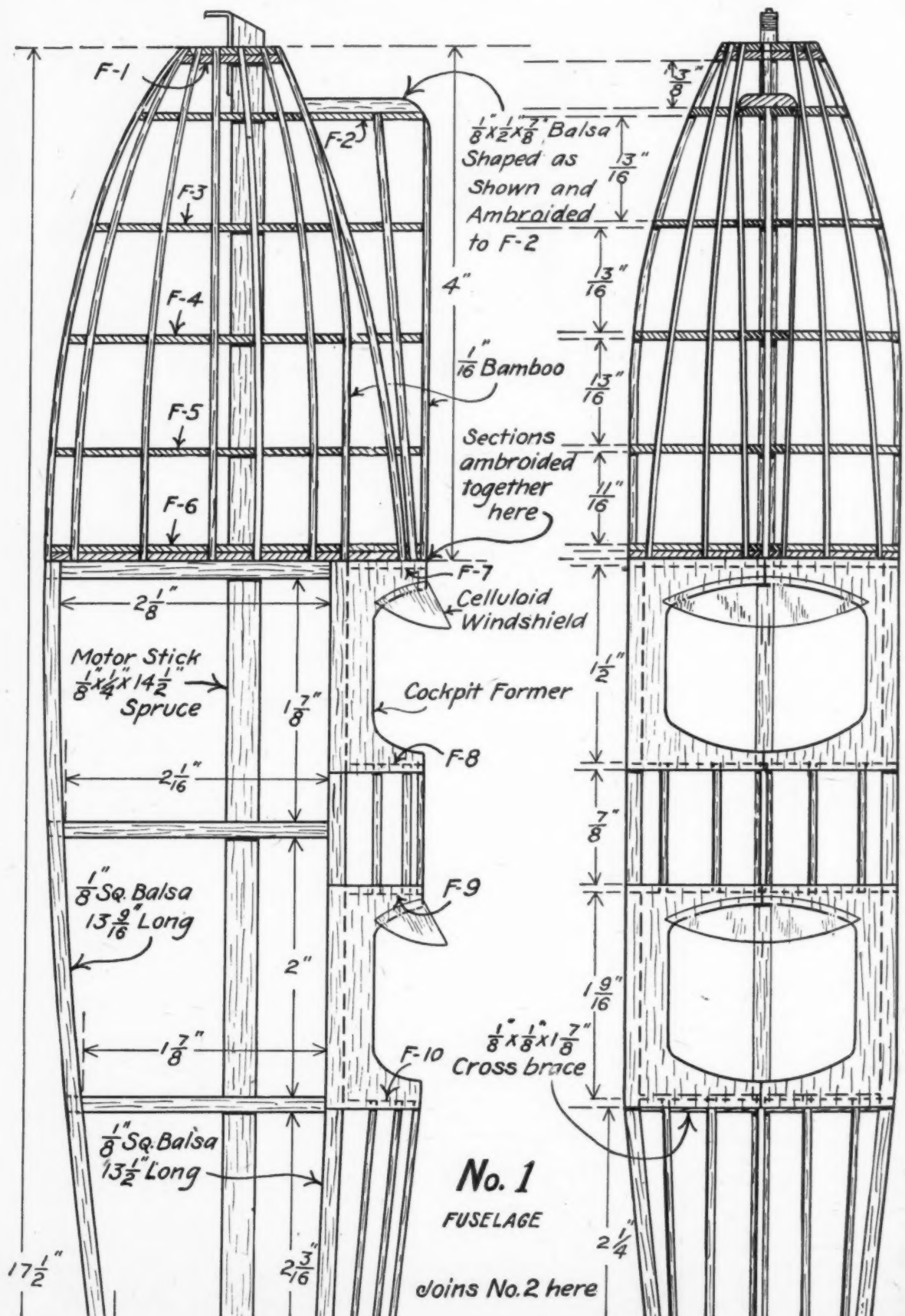
The cockpits are made with 1/32" veneer balsa cut to shape as shown in drawing. Make the instrument board and glue in place.

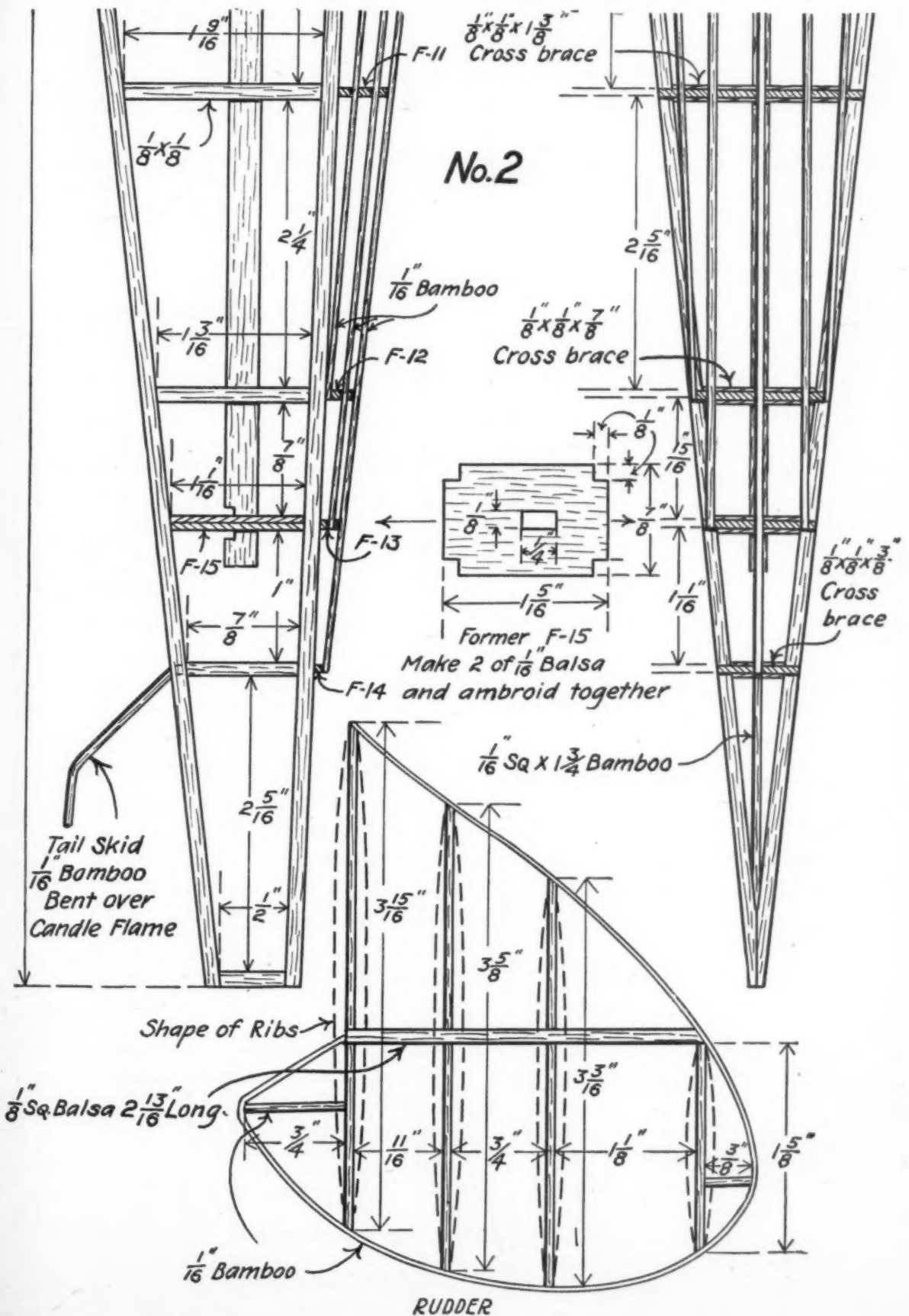
These add no weight and make the model look more complete. Celluloid is used for windshields.

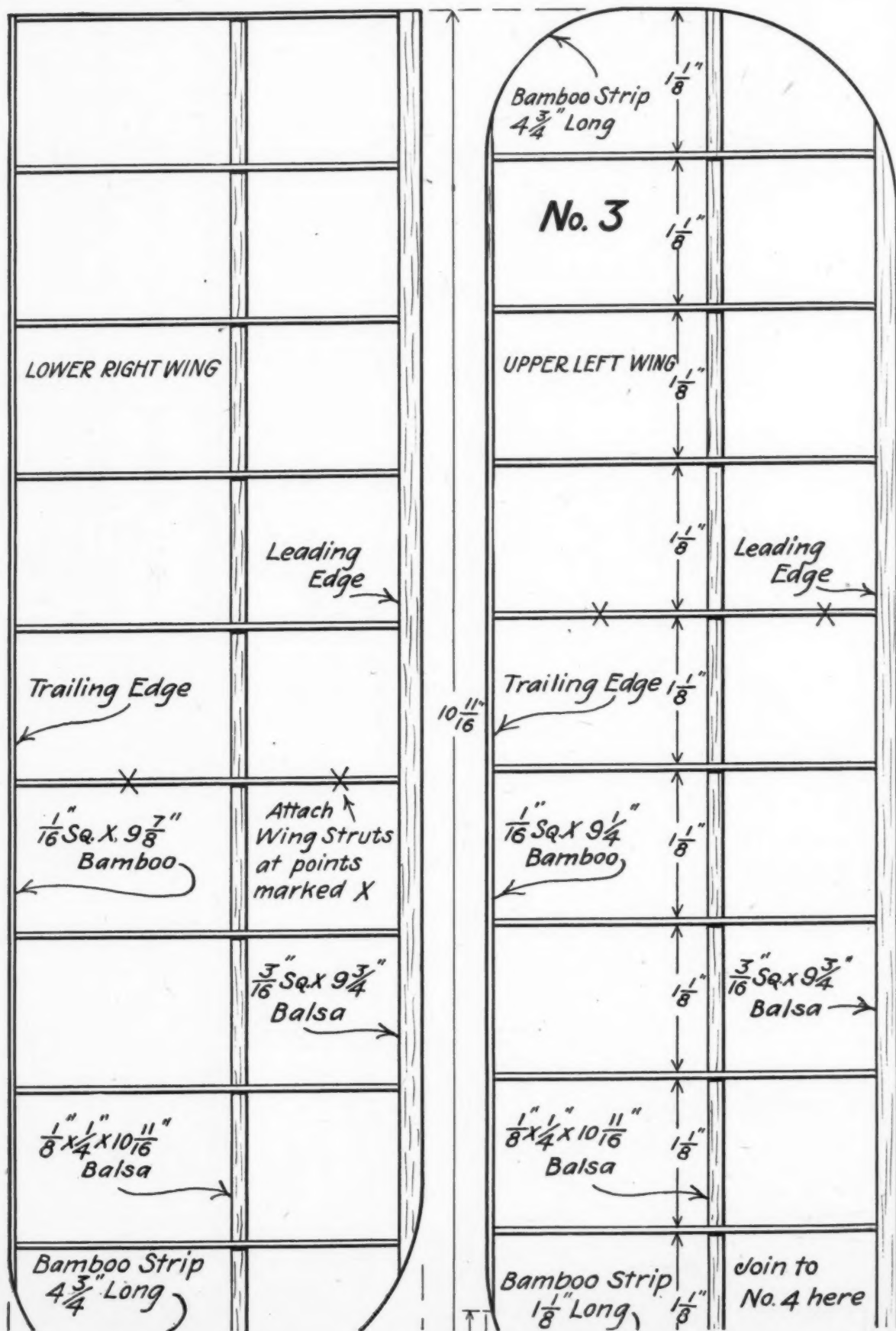
NOSE

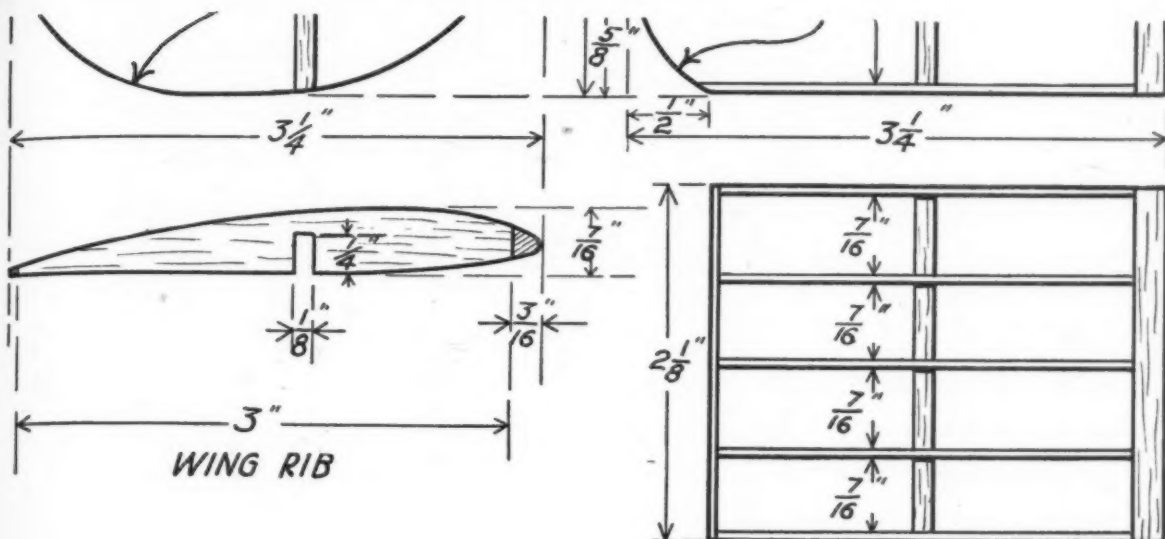
This is not as difficult to make as may appear but it does require patience and careful work. Use 1/16" balsa for formers 1, 2, 3, 4, 5 and 6 cut to proper shape and size. Use a sharp razor blade for this operation. All stringers are made from 1/16" square balsa. The motor stick clip is fastened, as shown in drawing, to former 1. When the nose is complete, attach to the fuselage with glue and fasten with pins. Set aside to dry.

(Continued on page 49)



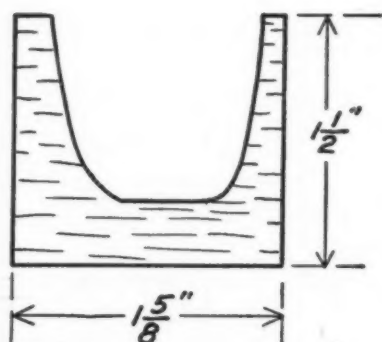




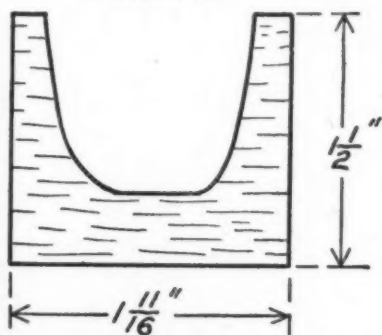


WING RIB

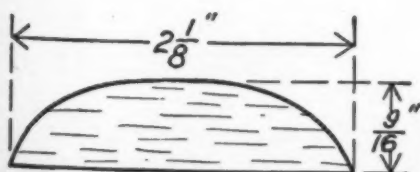
No. 4



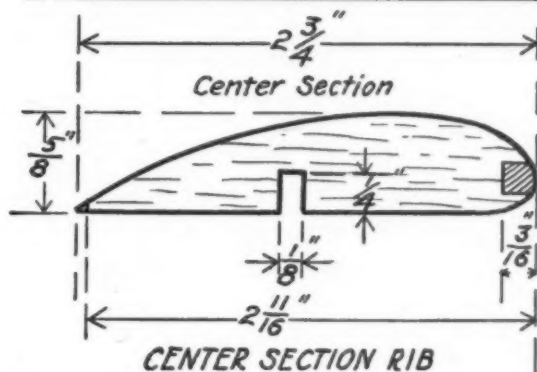
FRONT COCKPIT FORMER
Make 2



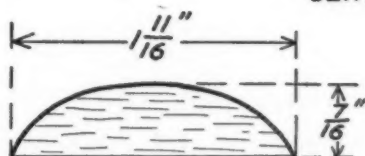
REAR COCKPIT FORMER
Make 2



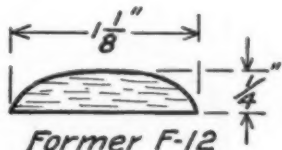
Formers F-7-8-9 & 10
Make 4



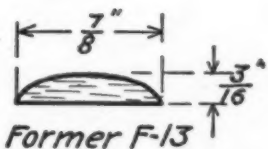
CENTER SECTION RIB



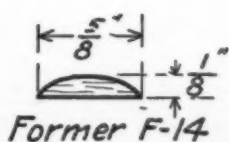
Former F-11



Former F-12



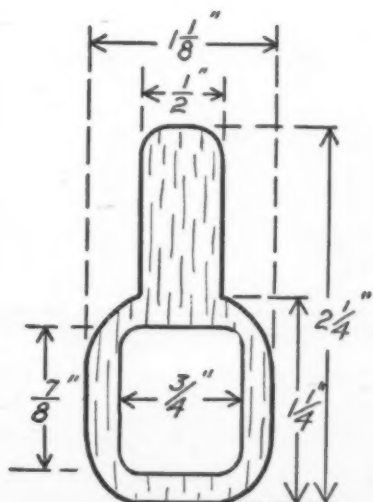
Former F-13



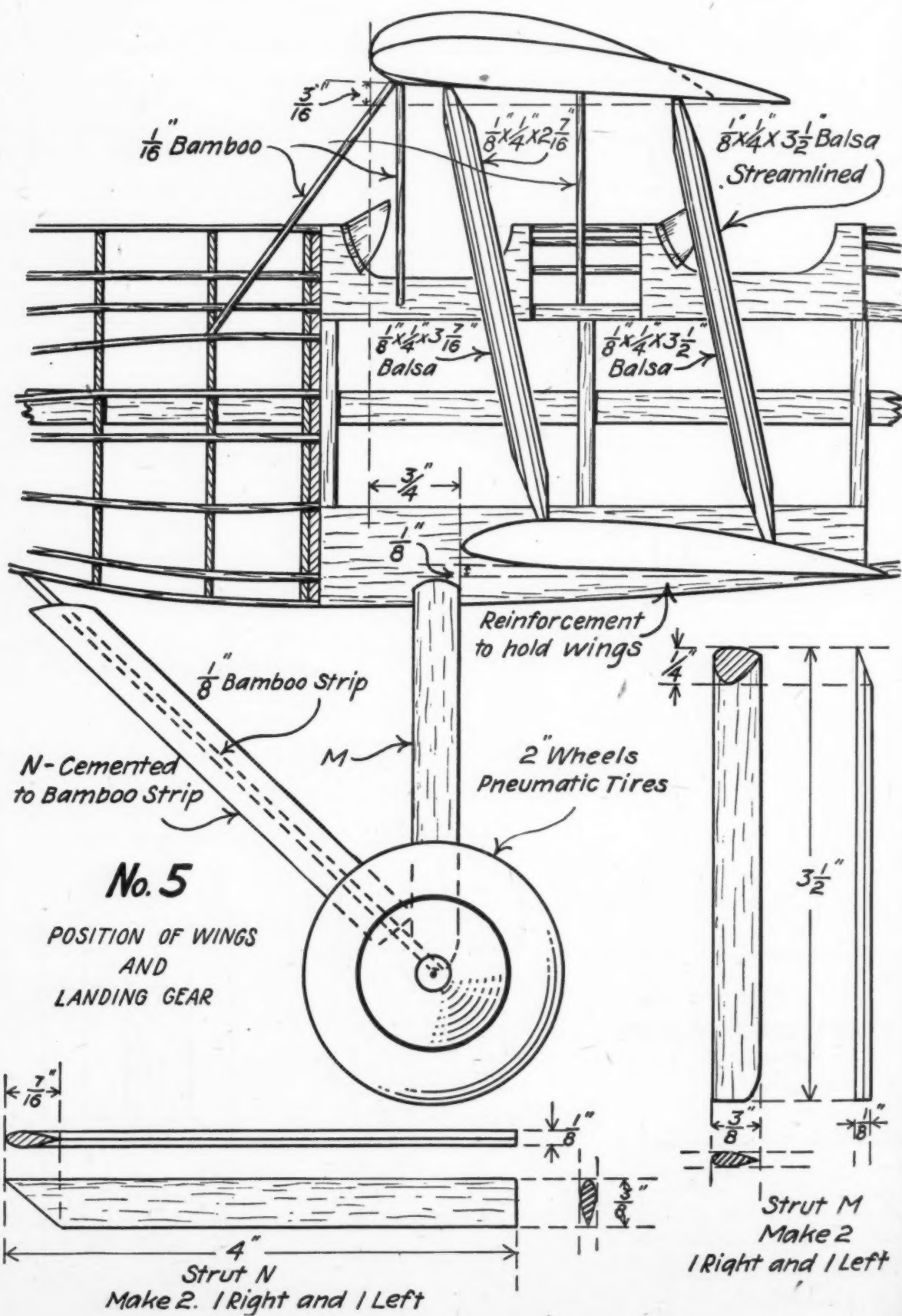
Former F-14

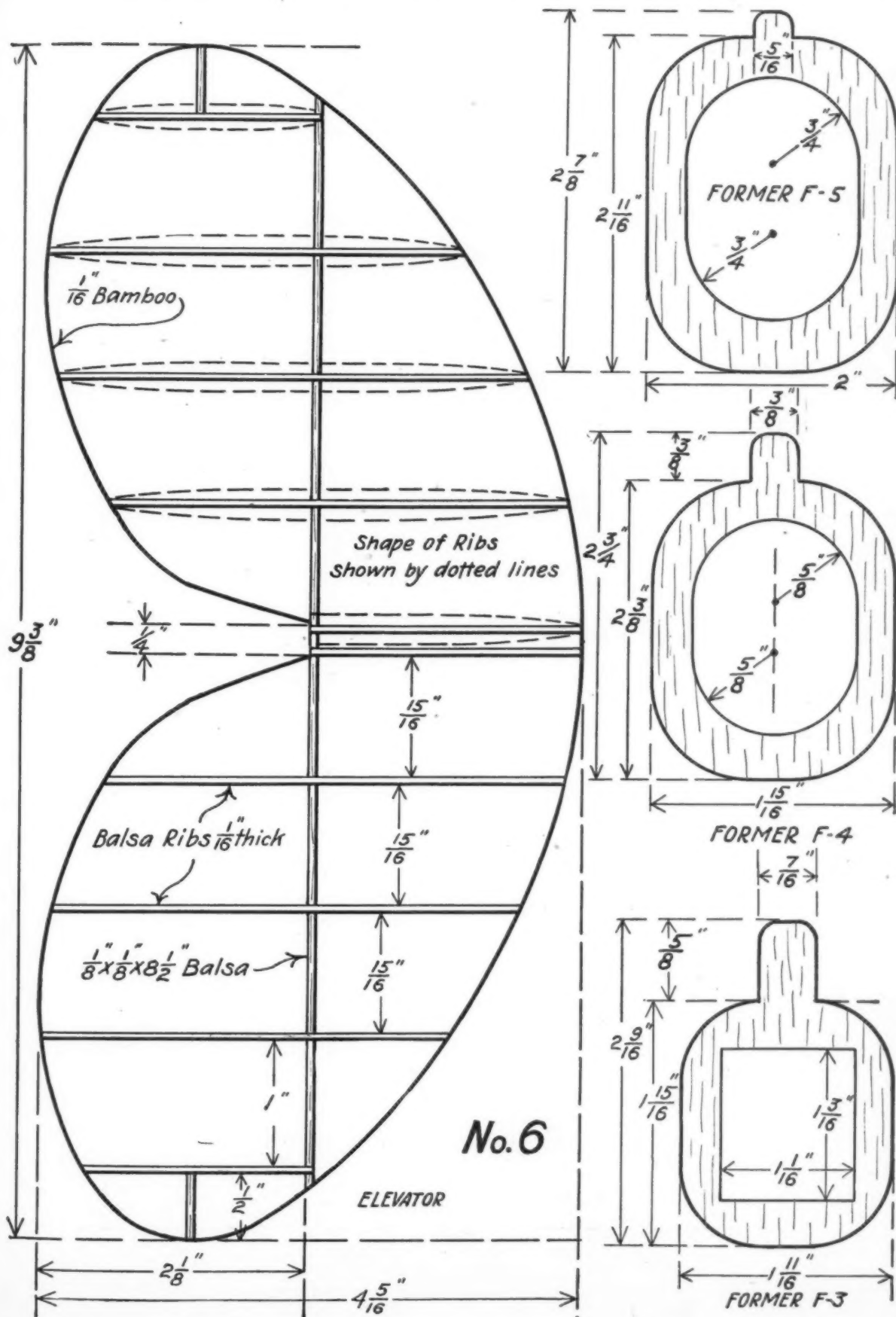


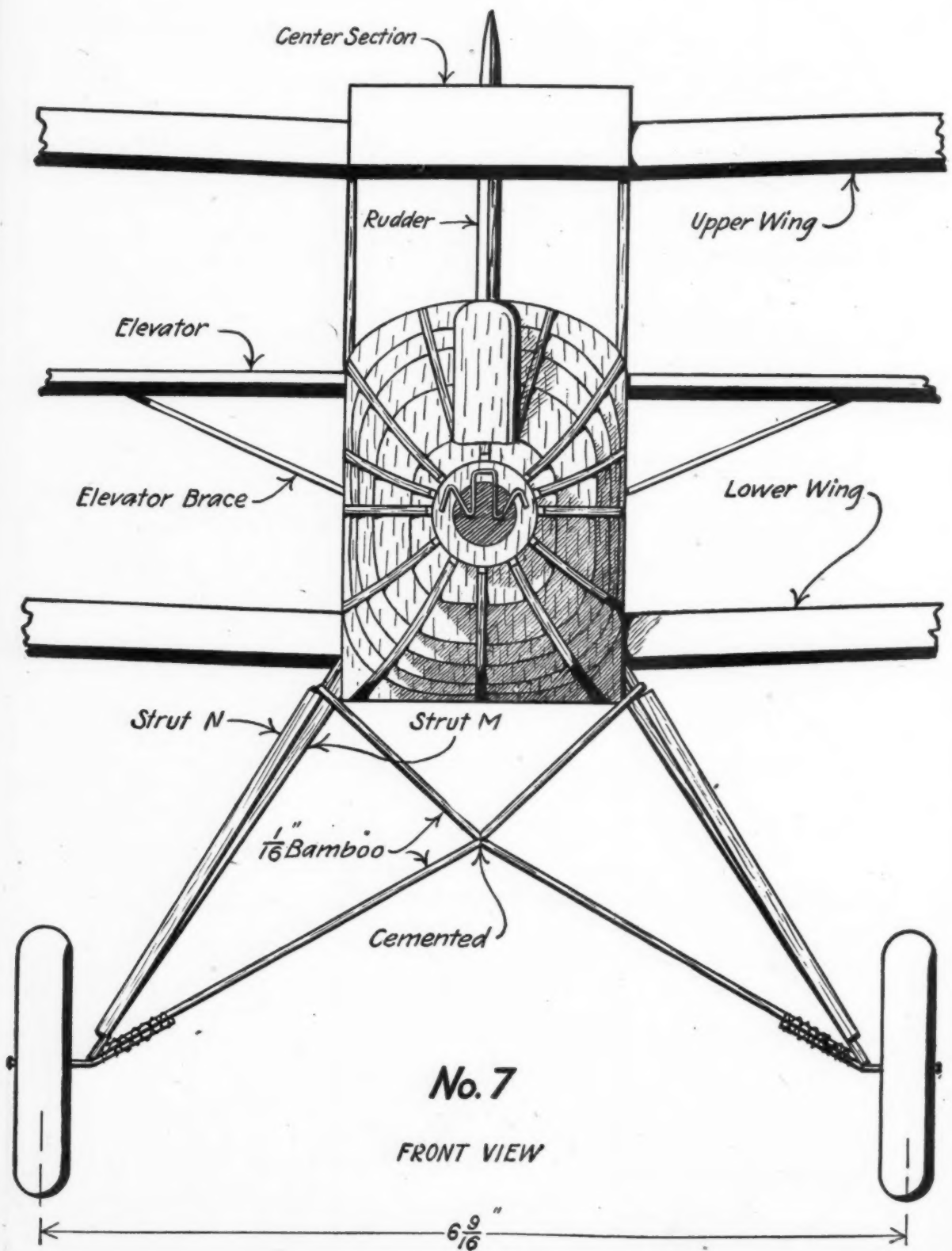
Former F-1



Former F-2









GLIDING and SOARING

A Manual of Motorless Flights

IN this issue the editor of MODEL AIRPLANE NEWS presents the second instalment of the long-heralded series on Gliders and Gliding.

The authors have obtained the material for these articles from all the most authoritative and up-to-date sources.

Percival White is well known as a writer. He has brought out many books on technical and semi-technical subjects, (such as "How to Fly an Airplane", published by Harper and Brothers), Mat White, the co-author, has collaborated with Percival White in the writing of some of his previous works.

By **PERCIVAL WHITE**
and
MAT WHITE

craft, it is conceivable that we might by this time be flying in highly efficient super-gliders, with flapping wings, or other bird-like contraptions, instead of in motored airplanes.

The early development of the glider, although it extended over centuries of time, was marked by little progress.

Lilienthal, who is fondly known in Germany as the father of modern planes, was able to sustain flight for a distance of only a few hundred yards, but even that was a great achievement.

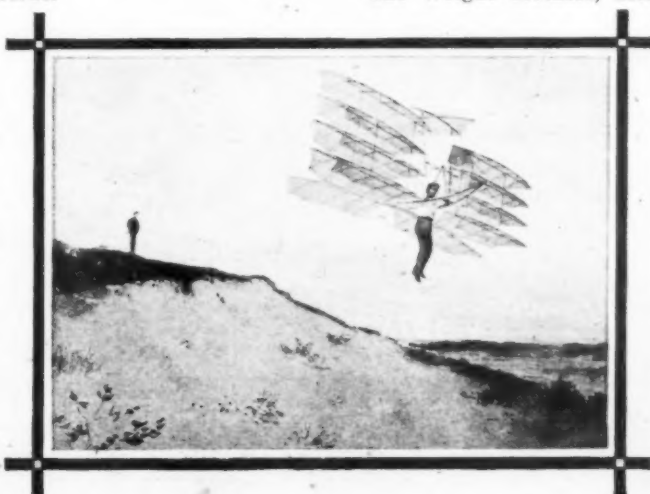
The Wright brothers, after long experiments with gliders, and as a direct result of such experiments, invented their motored plane in 1903.

Between that time and the end of the World War, the attention that was devoted to gliders was somewhat abated.

But in the past decade, such strides have been taken in the field of motorless aviation, that soarers are now available which

THE glider is sometimes spoken of as a fledgling, the offspring of the airplane. The metaphor is a false one. Gliding was the earliest form of heavier-than-air flight. If the gasoline engine had not been invented to direct into new channels the development of air-

A graphic photo of an 1894 Lilienthal glider, showing plainly the way in which the pilot swung his body in order to bank the craft



Chanute built this curious-looking glider in 1896. It had five wings and proved less successful than a biplane

fly for miles and can attain thousands of feet in altitude.

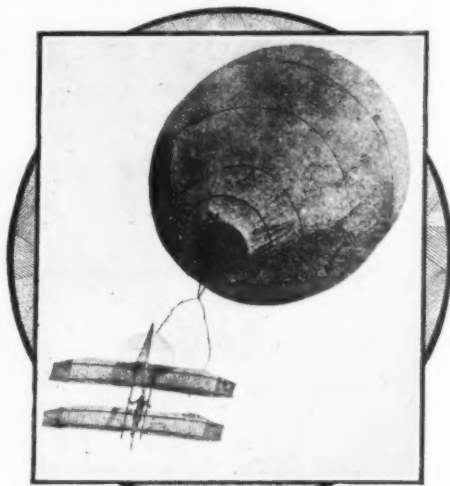
The Germans, above all other people, are responsible for this tremendous advance. The Treaty of Versailles imposed upon them such restrictions regarding engine-building that they were forced to turn their scientific genius toward the development of the glider. And they certainly did so.

Classic Examples of Gliders. Since time immemorial, men have tried to imitate the birds. Even mythology describes such attempts, notably those made by Daedalus and his son Icarus, who built wings from feathers fastened together by wax. As Ovid recounts the myth, Daedalus flew safely from Crete to Sicily; but Icarus, in spite of his father's warning, flew too near the sun, the wax melted, and he fell into the sea.

Between 400 and 200 B. C. experiments were made with man-carrying kites, which are, after all, first cousins to gliders. Archytas of Tarentum was, according to tradition, the first man to achieve flight in a heavier-than-air machine. Contemporaneously, the Chinese were developing the potentialities of kites.

Leonardo da Vinci, who was almost as great a scientist as he was a painter, evolved some theories of his own on the subject of flight. His most notable contribution to aviation was the invention of the parachute. He also built a flying machine. This was a bat-like device, with rudders on the wings and tail which were to be moved by the arms and legs of the pilot. This invention had little chance of success since no pilot was strong enough to control it!

Leonardo is said also to have been the first man to have



—courtesy Smithsonian Institute

In an effort to gain altitude this glider, constructed by Montgomery in 1905, was taken aloft and cut loose from a hot air balloon. Compare with the modern method of releasing gliders from dirigibles

experimented with the helicopter.

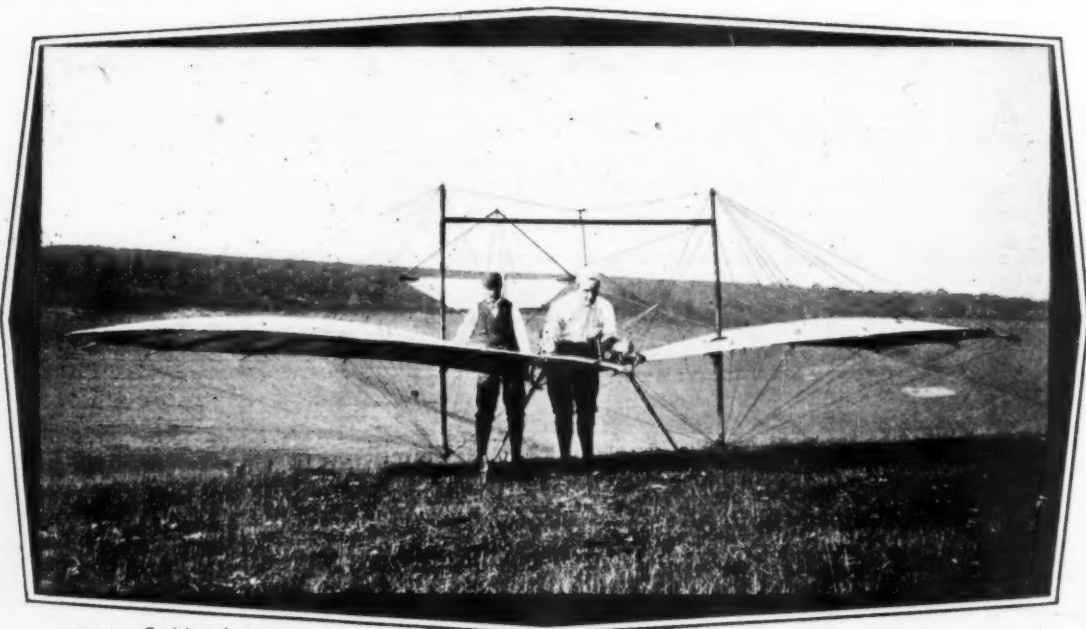
The First Successful Gliders. No consistently successful glider flights were made until the beginning of the Nineteenth Century. Sir George Cayley, an Englishman, built a glider which would fly for several yards at a time. He described his ship as "a beautiful white bird," which would "sail majestically from a hill to any given point of the plain below it." The discoveries which he made were the basis for aeronautical research during the next fifty years, and his success excited a good deal of interest in flying. The building of model gliders became quite the vogue at this time. Numerous new designs and principles were developed as a result.

One of the first glides of any length is said to have been made by a French soldier, named Le Bris. He built a ship

fashioned after the albatross. It was launched by being carried on top of a wagon drawn by a horse, until the horse ran fast enough so both glider and pilot were lifted into the air. Le Bris told a fanciful tale of how, during his entire first flight, the coachman, who had become caught in the glider's mooring rope, was dragged through the air suspended from the ship.

The efforts of Le Bris were supplemented by those of another Frenchman, Mouillard, who made a flight of several seconds' duration in a tailless monoplane.

Otto Lilienthal. The earliest glider flights were merely "slides down hill." But Lilienthal discovered the principles of soaring. This German had, as a foundation for his experiments, an extensive knowledge of birds and of mechanics. He built and flew a number of



—courtesy Smithsonian Institute

This glider, the most successful of the gliders built by Pilcher in 1897, is of individual design and embodies the principle of cambered wing surfaces. It weighed fifty pounds and once flew one hundred yards

gliders, and made many important discoveries, between 1891 and 1896.

He came to the realization that a curved wing surface had more lifting power than a flat one. (The principle of camber was brought to light, at about this same time, by an Englishman named Pilcher.) Lilienthal observed the increased efficiency which a glider obtains by flying directly into the wind. He came to the conclusion that the biplane was the most easily controllable type of ship. He learned to direct his path of flight by rudimentary fins. The wings of

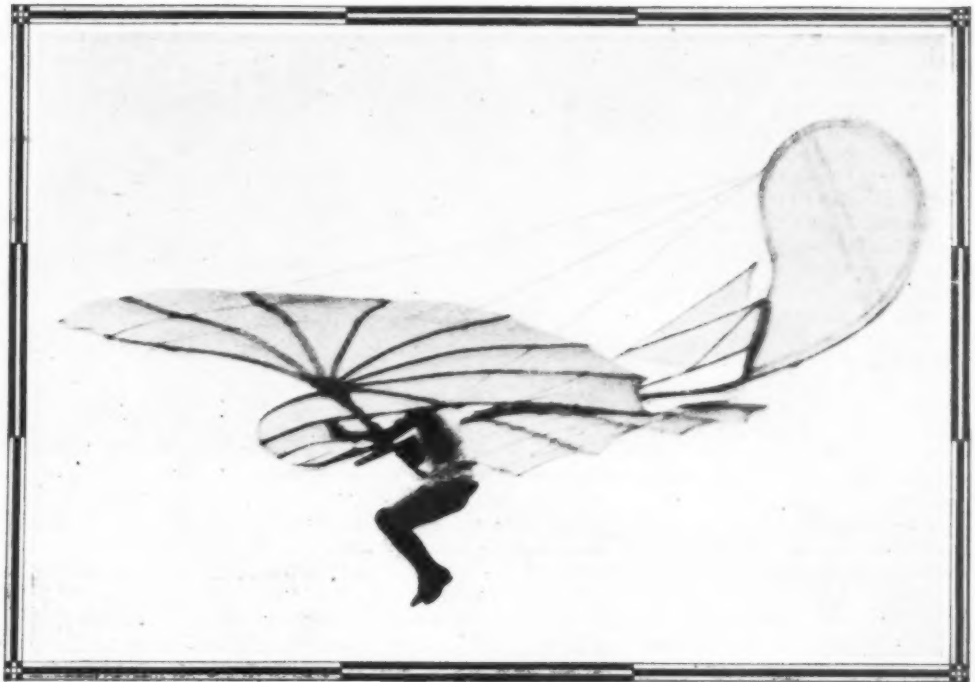
his glider could be moved like a bird's wings, so that lateral control would no longer depend upon shifting the weight of the pilot's body.

Lilienthal's death resulted from the crash of the last glider which he built. During his lifetime he had made more than two thousand flights, in some of which he covered distances of more than three hundred yards, and stayed in the air more than fifteen seconds. He had been able not only to fly straight, but also to make turns, and on some occasions to return to the take-off place.

Early American Contributions to Gliding. In the period following Lilienthal's death, the notable advances in the construction and flight of gliders were made by Americans, of whom the most illustrious were: Chanute, the Wright brothers, and Montgomery.

Chanute flew, at first, in gliders of the Lilienthal design. Soon, however, he began to build ships of his own invention. After experimenting with gliders having respectively five and three super-imposed wings, he built a biplane. This was controlled by bodily movements, supplemented by a horizontal rudder and fore-and-aft movements of the wings. In 1896 he made approximately one thousand flights.

Until 1900, all gliders were hang-gliders. Wilbur and Orville Wright built the first glider in which longitudinal, lateral, and directional movements were directed by manual control. They employed warped



—courtesy Smithsonian Institute

In 1894 this glider was built and flown by Lilienthal. In designing the bat-like wings, he utilized the theory that curved wings are more efficient than flat ones

wings instead of ailerons, and theirs was the first full-sized glider to be equipped with a movable vertical rudder. This ship was more efficient than any of its predecessors, partly because the pilot lay down in it, instead of hanging or sitting. In this way, the parasite resistance was reduced. Even after their success with powered planes, the Wrights continued their work with gliders, and set a flight record, in 1911, of nine minutes and forty-five seconds.

Montgomery, a Californian, who is said to have made the first flight in a glider in the United States, considered soaring of greater importance than motored flight. In 1884 he had built a glider with tandem wing-surfaces,

fixed vertical rudder, elevators, swinging wing-tips, and a seat which slid from side to side to effect lateral control.

In 1905, he built a light-weight glider, the *Santa Clara*, and had it, with its pilot, lifted to a height of four thousand feet by means of a hot-air balloon. When the pilot cut loose from the balloon, he was able to execute many complicated and graceful feats, before he reached the ground.

Glider Development, 1903 to 1920. Between the time of the invention of the first airplane, and the end of the World War, interest in motorless flight subsided. But the development of the glider continued by proxy, in the development of the airplane. Certain principles of control (e. g., the ailerons), and of design, (e. g., streamlining), which were being elaborated in order to make the

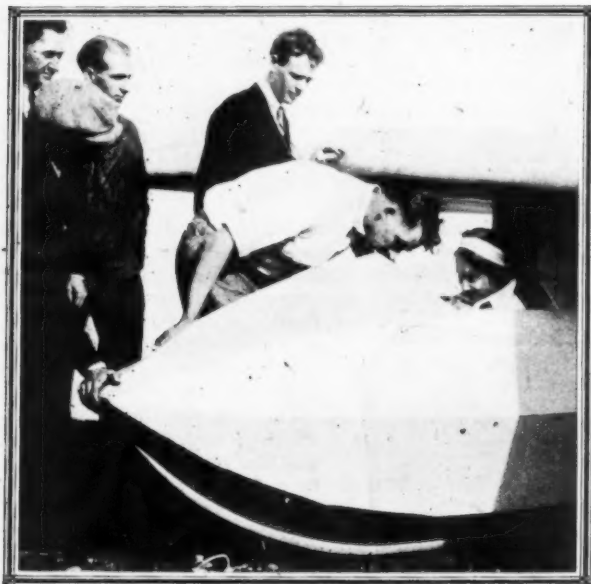


—courtesy Wm. Van Dusen

Col. Charles A. Lindbergh shown at the completion of his first sail plane flight on Point Loma, Calif. This lasted 31 minutes and gave him his first-class glider license

airplane more efficient, were later adopted by glider designers. The advanced type of gliders which have been built since the war are practically like motored planes in form, except that they have broader span, streamlined bodies, and they tend more to the monoplane than to the biplane type. During this period, airplane development as well as glider development, was practically nil in regard to aerodynamical construction of the plane. The main object since the time of the Wright Brothers was to improve the engine and to achieve by sheer force what perhaps better could have been accomplished by further experiments with gliders and soarers.

During the war, especially, money and life being considered as minor items, results were achieved principally by motor power, without regard to cost of money or life. After the war, the airplane emerged as a device which was neither safe nor commercially efficient. At this point the glider movement started and brought out new and better designs.



—courtesy Wm. Van Dusen

Mrs. Anne Lindbergh, wife of Col. Lindbergh, receiving final instructions from W. Hawley Bowlus before making her first glider flight, after which she was given a first-class glider license

Glider Development Since the War. The metamorphosis which has occurred in the field of motorless aviation within the last decade is breath-taking. The record of the Wright brothers was broken by Hentzen in 1922, who flew for three hours and six minutes; by Kronfeld, who, in 1929, traversed over 90 miles in a single flight; and by Ferdinand Schulz, who, in 1929, remained aloft for more than fourteen hours. The improvements which have been made in glider construction may be partly comprehended by reading the chapters on What the Glider Looks Like and How the Controls Work. The

chapters on soaring give some idea of the development in glider flight which has taken place since the time of the Wrights. These will be published in future issues.

The Germans, who began to form glider organizations before the commencement of the war, and who have accepted gliding as a national sport, have been the major contributors to the development of the science. Nevertheless, several waves of glider enthusiasm have swept over the United States, as well as over England and France, with the result that Bowlus, an American, in February, 1930, stayed aloft for over nine hours, establishing a record for the United States.

Until the invention of the airplane, the history of gliding was the history of flight itself. The fact that gliders and airplanes now exist as separate entities does not necessarily mean that the divergence between the two forms of ships will be lasting—the advantages of the one will be merged with the advantages of the other. At any rate, the progress of gliding is watched with joy by aeronauts of all sorts. The Allies, in depriving the Germans of powered airplanes, did a tremendous service (unknowingly) to the future of aviation.

Chapter IV

QUALIFICATIONS OF A PILOT

PRACTICALLY all persons within certain age limits, who have no physical or mental deficiencies, can learn to become pilots. Nevertheless, not everyone can become a good pilot. A few of the qualities which go to make up a good pilot are definable, and will be cited here. Most of the essential qualifications of a good pilot are, however, difficult to determine in advance. Only after hours of gliding can a flyer's capabilities be accurately judged.

It is self-evident that the requisites for successful soarer pilots are much greater than those for the pilots who merely glide down hill; but every glider pilot expects to soar.

Age. One of the great advantages of gliding as a means of flight training is the fact that gliders can be flown by youngsters too young to obtain airplane licenses. (Airplane licenses are not granted to persons less than sixteen years of age.) Nevertheless, the minimum age limit for glider pilots must be set somewhere between twelve and fourteen years. A certain degree of physical strength and maturity of judgment are necessary for successful gliding.



Members of the Anne Lindbergh Gliders of San Diego, Calif. pulling off one of their members by shock cord

—courtesy
Wm. Van Dusen

Boys and girls of fourteen years of age are exceedingly quick to learn, and actions readily become instinctive to them. They have passed the stage where they were content to toss about paper airplanes; they are still too young to fly motored planes; gliding stimulates their interest in aviation.

Just as people between twenty and thirty have so far proved the most apt airplane student pilots, so are they also the most efficient and adaptable glider pilots. On the other hand, no one in possession of all his physical and mental faculties is too old to learn to glide.

Sex. So far, few women have made noteworthy glides. This is apparently because the feminine mind is neither scientific nor experimental; for, gliding offers as splendid opportunities to women as to men. It is a gentle sport, and requires a readiness of decision in which many women excel men.

Physical Qualifications. Only average physical strength is necessary for the glider pilot; but a sound general physical condition is essential. The pilot with unsteady nerves, faulty heart or lungs, might fare ill because of an air bump or a sudden landing. Moreover, the pilot must have a good sense of balance. A test used in the army for power plane pilots is for the prospective ace to maintain his equilibrium for twenty seconds, while standing on one foot with his eyes closed.

The ill effects which any one physical defect will exert cannot be estimated beforehand. One person might be greatly handicapped by a defect, while another, with the same defect, might have other qualities to offset his deficiency entirely.

Vision. Since the glider's speed is comparatively low, glider pilots perhaps do not need such good vision as motored plane pilots. Nevertheless, glider pilots must be able

to judge altitude and distance by eye; hence color blindness or double vision might, on occasion, be a serious drawback. The fact that pilots maintain a straight course by keeping their eyes fixed on a distant sight, also makes good vision of importance.

Hearing. The hearing which the pilot must possess is not so much the ability to notice low sounds, as it is the power to distinguish one sound from another. The pilot, when in the air, can frequently approximate the direction and velocity of air currents by the rustling which they make in the trees or bushes on the ground. As the speed of the glider becomes greater, the humming of the wind through the struts and wires grows more high-pitched. The pilot should be able to calculate the sharpness of a dive, by being able to recognize these variations in pitch.

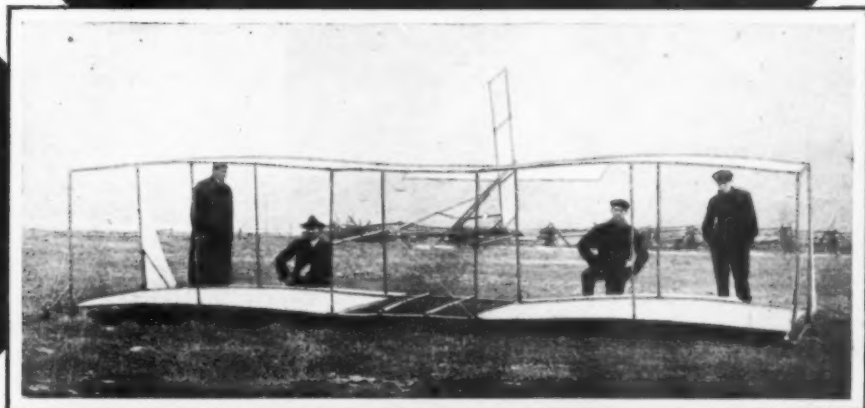
Judgment. It is of the utmost importance that the glider pilot have good judgment. In fact, judgment is a quality quite as essential to him as to the airplane pilot. Airplanes are flown according to a comparatively mechanical routine process. Gliders must be flown as the particular weather conditions of the day may dictate. The great difference is that failure to judge promptly and wisely in an airplane may be fatal; whereas the same failure in a glider will usually result only in the flight being cut short.

Promptness, as well as coolness, of judgment is necessary. Although the glider itself does not travel fast, air currents are fleeting, and the pilot must decide how to avail himself of them

(Continued on page 52)

An interesting photograph of an early Curtiss glider, showing clearly the simple construction in its box-like form, as contrasted with its evolution into the glider of today

—courtesy
Smithsonian Institute



JACK NAURET (at right) holding a model of a U. S. Navy Combat plane with which he won first prize at the Junior Meet of an aircraft exposition at Los Angeles. This was placed on display with hundreds of other models, all built with remarkable fidelity to their originals, in conjunction with the exposition, and aroused the admiration of all visitors

Wide World



IN oval is shown Edwin O'Donovan of Topeka, Kansas, who emerged 1929 junior model aircraft champion of the United States at the Louisville Tournament with his cabin endurance model. (Left) Christy Magrath with his Lucast type duration model, first prize winner at the Junior Aviation Club contest at St. Louis. His longest time for continuous flying was 8 minutes

Wide World

Special Course in Air Navigation

The Mainstay of Successful Piloting

By Captain
LESLIE S. POTTER

IN the following series of articles, the author has endeavored to set out as clearly as possible, and in as simple words as possible, the art of navigation in the air.

Your interest in these will depend on your interest in flying, and whether you will consider yourself a pilot when you have learned to take a plane off the ground and bring it down again without breaking anything.

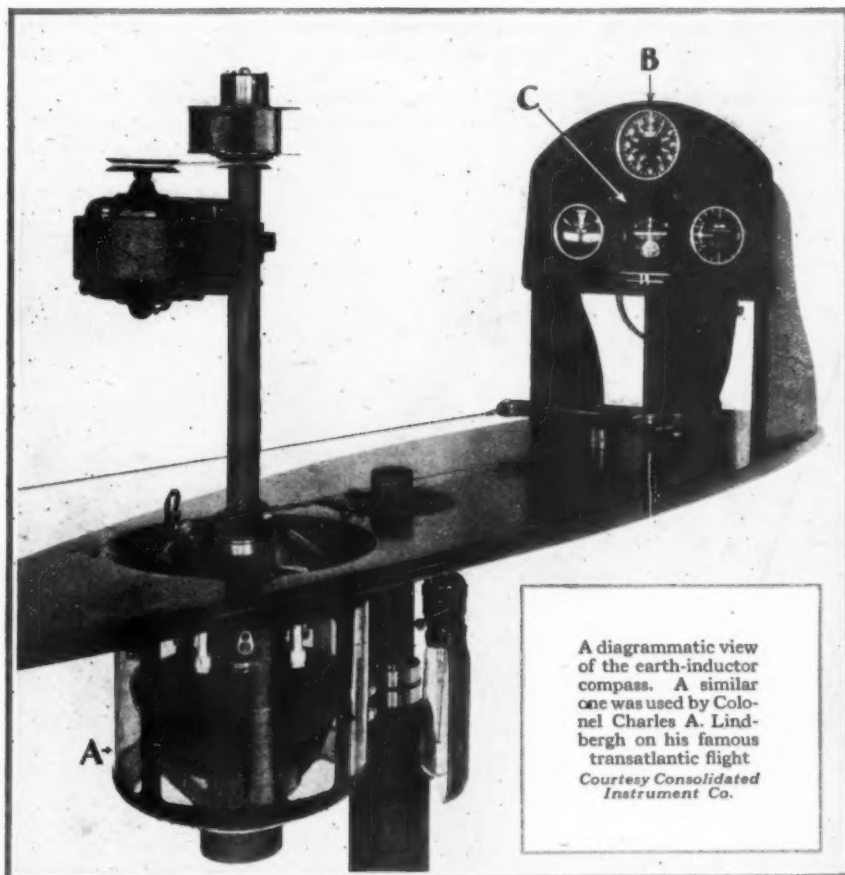
To those who do, these articles will be valueless, but to those who aspire to be more than fair weather pilots, to be able to fly from place to place without sole recourse to roads and railways, to be able to fly above the clouds with safety if they are too low to admit of safe flying beneath them, an intelligent interest in these articles will be of incalculable value.

Air navigation is not a complicated subject, an intense knowledge of mathematics and trigonometry is not necessary, merely the average person's powers of common-sense reasoning. The *whys* and *wherefores* of all the facts will only be given where they are necessary to understand the facts, as it is considered that in a short course too many of these would be confusing and apt to mislead the reader.

If some of the points seem too elementary do not pass them by, there is a reason for their inclusion, if some points do not seem clear, be patient, you will generally find some information further on, that will clear them up as you proceed. Answer the questions at the end of each article and wait for their solutions in the next issue, and should you find any points requiring further explanation, send a letter with a stamped addressed envelope to the editor setting out your problems and a reply will be sent you explaining the points raised.

Keep all your copies of "MODEL AIRPLANE NEWS" for future reference, you will probably need them to refer to as you go on.

THE EDITOR



A diagrammatic view of the earth-inductor compass. A similar one was used by Colonel Charles A. Lindbergh on his famous transatlantic flight
Courtesy Consolidated Instrument Co.

VARIATION. It was explained last month that the Magnetic Poles are not coincident with the true poles, and that a magnetic compass needle will invariably point to the Magnetic Pole, unless influenced by local disturbances.

A freely suspended magnetic compass needle at New York, for example, would point about 11° West of the True Pole, if there were no other forces acting on it, so that at New York the variation is 11° West or —11°.

All aviation maps and charts give the variation for the regions shown on them. Sometimes these are shown by Isogonals and Agonic lines (see lecture 1 for definitions). In addition to this they generally give the annual rate of change of variation in the districts they cover. The variation at different places on the earth changes fairly regularly and slowly.

This variation is only slight, but it generally happens that maps remain in use for long periods after they are prepared—there is no object in altering them, since none of the features they show will alter materially during that time except the variation.

It is therefore necessary to know how to calculate the change in variation. You will often see on a map, "Variation (or Declination) 14°—12' W. 1920 changing 8' E. annually. In such a case as this you would want to know what the variation for 1930 was before calculating your course, and would calculate it as follows:

Variation 1920	14° 12' W.
Annual change (10 years @ 8') =	1° 20' E.
Variation in 1930	12° 52' W.

It should be remembered that ° is the sign for degrees, ' is the sign for minutes, and " is the sign for seconds. There are sixty seconds in a minute and sixty minutes in a degree. In the example above, the variation was westerly and the change of 8' E. became 80' or 1° 20' E. in ten years.

Since the change is easterly, it is of course decreasing the westerly variation and has to be subtracted. The following examples will illustrate:

EXAMPLE II.

The variation in 1915 was 10° 15' W. Annual change 12' W. What would the variation be in 1930?

Variation in 1915 10° 15' W.
Change (12'×15) 3° 00' W.
Variation in 1930 13° 15' W.

EXAMPLE III.

The variation in 1912 was 18° 10' E. Annual change 7' W. What would the variation be in 1930?

Variation in 1912 18° 10' E.
Change (7'×18) 2° 06' W.
Variation in 1930 16° 04' E.

EXAMPLE IV.

The variation in 1918 was 20° 15' E. Annual change 10' E. What would the variation be in 1930?

Variation in 1918 20° 15' E.
Change (10'×12) 2° 00' E.
Variation in 1930 22° 15' E.

WHEN you obtain a bearing on a map or chart with your Protractor, you place the center of the Protractor over the point of departure and see that the edge of the Protractor, or any lines on it, are parallel with a meridian passing through, or near, your point of departure.

Sometimes an arrow is shown on the map running true north and south, in which case this would serve instead of a meridian. The point being emphasized here, however, is that whether you align your Protractor on an arrow or on a meridian, the angle you are measuring is from a line running true north, as opposed to a line running to the magnetic north, and the bearing you will obtain will be a true bearing. But the bearing you will get with your magnetic compass will be a magnetic bearing, as the needle will always be attracted to the magnetic pole.

It follows, therefore, that if you are to use your magnetic compass (and the majority of compasses in airplanes are magnetic compasses) to steer to your destination, you must adjust your true bearing to a magnetic bearing. To do this, having obtained your true bearing from the map, you:

ADD westerly variation to obtain magnetic bearing
DEDUCT easterly " " " " " "

The reverse operation will be necessary to obtain a true bearing from a magnetic bearing.

DEDUCT westerly variation to obtain true bearing from magnetic
ADD easterly

This is an adjustment you would have to make if you had obtained a bearing with your compass in the air, on an object on the ground, and wished to draw a position line on the map, where all places are at TRUE bearings from each other.

This is one of the most essential points to remember in air navigation, and these rules *must* be carefully memorized. Memorization is sometimes assisted by remembering the rhyme:

"Variation west, magnetic best,
Variation east, magnetic least."

and then regard all variations as being corrections from a magnetic to a true course. As is seen, if when the "Variation is west the magnetic is best", you would deduct any westerly variation to get the true bearing and vice versa. It may be found easier simply to commit the rules themselves to memory. Both methods, however, are offered.

The following examples illustrate the rules:

EXAMPLE I.

The true bearing of A from B is 80°, the variation was 15° 20' W. in 1912, increasing 6' annually. What is the magnetic bearing in 1930?

Variation 1912.. 15° 20' W.
Increase (6'×18) 1° 48'
Variation 1930.. 17° 08' W.
True bearing... 80° 00'
Variation 17° 08' W.
Magnetic bearing 97° 08'

EXAMPLE II.

The bearing of A from B is 120° true, the variation 16° 54' E in 1914, decreasing 9' annually. What is the magnetic bearing in 1930?

Variation 1914..... 16° 54' E.
Decrease (9'×16)..... 2° 24'
Variation 1930..... 14° 30' E.
True bearing..... 120° 00'
Variation..... 14° 30' E.
Magnetic bearing..... 105° 30'

EXAMPLE III.

Magnetic bearing from A to B is 5°, variation 20° W. in 1912, decreasing 11' annually. Find the true bearing in 1930.



Courtesy of the Consolidated Instrument Company

The photograph above clearly illustrates the engine control showing the three handles—top left, "throttle" or accelerator; at right, the spark, and at bottom, the mixture-control handle

Variation 1912.....	20° 00' W.
Decrease (11'×18)	3° 18'
Variation 1930.....	16° 42' W.
Magnetic bearing.....	5° 00'
Add.....	360° 00'
	365° 00'
Variation.....	16° 42' W.
True bearing	348° 18'

EXAMPLE IV.

Magnetic bearing from A to B is 350°, variation 16° 45' E in 1918, increasing 12' annually. Find the true bearing in 1930.

Variation 1918.....	16° 45' E.
Increase (12'×12)...	2° 24'
Variation 1930.....	19° 09' E.
Magnetic bearing....	350° 00'
Variation.....	19° 09' E.
	369° 09'
Deduct.....	360° 00'
True bearing.....	9° 09'

DEVIATION

To explain this once more, deviation is the number of degrees a compass needle is deflected off the magnetic meridian along which it would normally lie if uninfluenced by local forces.

In an airplane, the presence of masses of metal, portions of which possess magnetic properties of their own, causes deviation. The amount of the deviation is ascertained by aligning the plane on a known magnetic course and observing the reading of its compass.

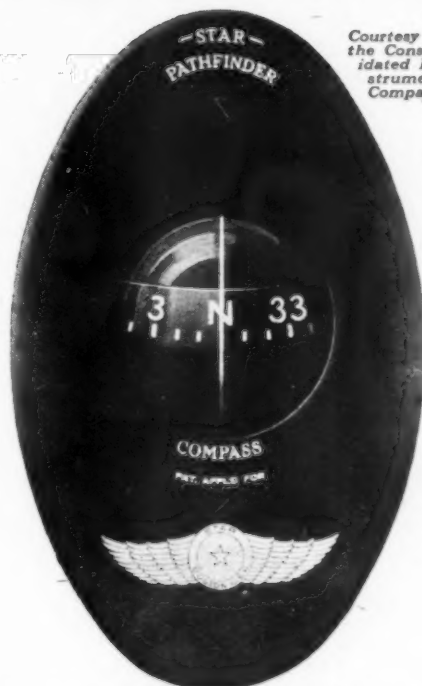
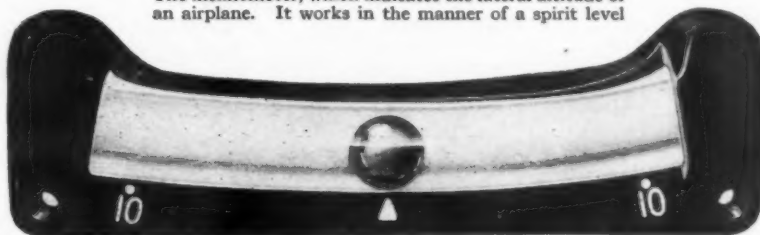
We are only concerned at this stage, however, with making the correct allowance for deviation when its quantity is known. The best way, obviously, would be to correct the compass exactly, but this is, unfortunately, generally impossible to do on all its points, and so the amount of the deviation of the compass at these various points is written on a card affixed in the plane somewhere near the compass.

We have just seen how to calculate the magnetic course, and now we have to calculate from this the compass course by allowing for the deviation shown on the compass correction card. Allowance for deviation is made in precisely the same way as allowance for variation. That is to say:

From Magnetic course to Compass course ADD westerly deviation
DEDUCT easterly "
From Compass course to Magnetic course DEDUCT westerly deviation
ADD easterly "

Fig. 5, on page 50, is an illustration of a deviation card.

The inclinometer, which indicates the lateral altitude of an airplane. It works in the manner of a spirit level



This is a type F magnetic compass comprising a compensating unit which eliminates the use of troublesome loose magnets

The deviations of + or easterly, and — or westerly, are considered as corrections from the compass to the magnetic course. That is to say, if a compass reads less than it should, it is an easterly deviation, and vice versa. Now it may happen that you would want to know the deviation on a point not shown on the correction card.

Suppose your course were 30°. By the card in figure 5 your deviation is 0+2 on 0° and +4 on 45°, so that between these points, the deviation increases 1° over 22 points on the compass. Your course is 30°, so the deviation will be approximately 1° more at this point than it

was on 0°. It will therefore be +3, and the course for you to steer by compass will be 27°. Once you have memorized these rules, these small adjustments will be made mentally without effort.

The compass error will be the net adjustment made on your true course for variation and deviation.

If your true course were 120° your variation 18° W, and deviation 6° E, you would add the variation and deduct the deviation, and the net result would be an addition of 12° to your true course. This would be the compass error.

ANSWERS TO LAST MONTH'S QUESTIONS

1. The Prime Meridian is the one from which longitude is measured. The meridian of Greenwich, England, is accepted as the Prime Meridian by most countries.
2. Variation is the angle caused by two lines running true north and magnetic north from the point of departure, and deviation is the angle between a line running magnetic north and the line indicated by a particular compass needle.
3. Latitude is measured in degrees, minutes and seconds up to 90 north or south of the Equator.
4. There are 60 nautical miles in one degree of latitude.
5. Great Circle courses are preferable to Rhumb Line Courses over long distances, when the distance to be saved is considerable. The disadvantage of such a course is the fact that it has to be more carefully computed, and the compass course of the airplane changed at frequent intervals.

THIS MONTH'S QUESTIONS

1. The True Bearing from A to B is 180°, the variation in 1915 24° 15' W., decreasing 9' annually. Deviation 6° W. Calculate

(Continued on page 50)



WINGS of VALOR

JAMES WEBSTER, a mail pilot, is kidnaped making a regular trip from Salt Lake City to Cheyenne. When he fails to reach Cheyenne on time, Salt Lake City is notified and his son, James jr., starts out in another plane to look for his father.

With no luck on his search, Jimmy returns to the flying field and finds that a plane has flown over and dropped a message demanding a ransom of ten thousand dollars for his father. There is the further news that instructions for the payment of the ransom will be dropped from a plane that night.

After much persuasion Jimmy gets the consent of the superintendent to follow the plane when it reappears that night.

After much difficult flying and a far more difficult landing, Jimmy finally tracks the bandits to a cabin in the mountains. Here he finds his father and is taken prisoner himself.

As he lies in the bunk, Jimmy overhears plans to kidnap the mail and pilot on that day's trip. Realizing something will have to be done to prevent it, he manages to cut the bonds holding his father and, when the bandits take off in their plane, leaving one of their band to guard their two prisoners, the latter rush him and make for Jimmy's plane.

Jimmy is in the lead and just as he reaches his plane, he hears a shot and, turning, sees his father on the ground. Webster senior orders Jimmy to go on, which he does though much against his will.

Jimmy follows the bandit plane until it meets the mail plane. The bandits pretend they are having engine trouble and start to dive. The mail pilot starts to their aid but Jimmy intercepts him and warning him away, goes down after the bandit plane.

THE hold-up plane had already landed. Jimmy saw the figures of three men alight from the motionless ship and cast puzzled glances up to the sky, first at the Morgan ship speeding toward the heart of the Rockies and then to him, of whose presence they had been unaware until that moment. Jimmy smiled to himself. The first part of his job was done. Now to reach the field, and procure help before the others could return to their mountain lair and plot fur-

By
JACK D'ARCY

ther. He banked just above the tree-tops and manipulated his controls so that the nose of the Sikorsky was headed toward her home hangar.

A missing beat in the rhythm of his motor came to his alert ears.

He shut down the throttle a little and listened tensely. Diagnosing the trouble as of the feed line, he hastily leaned forward in the cockpit and fumbled with the emergency gas pump.

Jimmy's heart sank within him, as he came to the sudden realization that he was out of fuel. The long trip of the night before and the frenzied chase of that day had drained the plane of its entire supply of gas. The flyer in Jimmy Webster functioned instinctively. Even as he volplaned down to earth again, his keen eye was surveying the ground below for a flat landing place. A sense of utter futility overcame him as he realized that there was no possible place for a plane to achieve a safe landing, other than on the small flat place occupied by the bandits' ship.

HE was steadily losing altitude, and with a stifled sigh of despair, he headed the Sikorsky for the plot of ground on which the three kidnapers were standing, gazing up into the heavens at his impotent ship.

Slowly he glided down, conscious of a sickening sensation of defeat in his heart which had beat so triumphantly but a moment before. Skillfully, he brought her out of the dive just as his landing gear scraped the earth. The Sikorsky, lacking flying speed, bumped jerkily, and taxied unevenly before she came to a halt. Jimmy Webster sprang from the cockpit, and defiantly faced the three men that were bearing down upon him.

Scarface was the first to reach him. He shouted a vile oath as he stopped and confronted the boy who had frustrated his nefarious scheme. Jimmy's countenance burned at the epithet but, his nails biting into his palms, he held his peace. There yet might be a way to outwit these outlaws by quiet strategy.


Blackbeard's roaring voice boomed into his ears.

"Curse you," he roared. "Where's Joe?"

"Back at your camp," retorted Jimmy evenly.

"I'll kill him for letting you get away," swore Blackbeard. His anger rose to a crescendo bellow which boded no good for the luckless Joe.

Jimmy Makes His Last Stand and Fights Through to a Smashing Victory



Scarface threw an arm over his comrade's shoulder.

"Don't fly off the handle," he counselled. "This whelp has upset our plans again. We've got to decide what to do quick. That mail pilot will suspect something and report this at Cheyenne."

Blackbeard acknowledged the truth of the other's statement by lapsing into a thoughtful silence. He stroked his heavy black beard and his brow wrinkled in thought as he gazed malevolently at Jimmy. Scarface pulled a gun from his pocket.

"I'm sick of the whole deal," he said. "Let's bump the kid off now and go back and finish his old man. To hell with the ransom. We can sell that mail ship we've got for something, anyway."

He made a threatening gesture with his gun toward Jimmy. The lad met his gaze squarely and did not flinch in the face of death.

Blackbeard seized him by the wrist.


"Don't be a fool," he growled. "What's the use of giving up the game now. We'll bundle that kid in a plane and fly over Morgan Field again. We'll drop 'em a note, telling them that unless we have the cash tonight, we'll kill both the kid and the other one."

Scarface shook his head and Jimmy's heart leaped for a moment. If they dropped another note at Morgan Field it was a moral certainty that the super would send someone to follow them. But it seemed Scarface had also anticipated this.

"That's no good," he said. "They'll only send a plane after us if we fly over to drop another note."

Blackbeard considered this for a moment in silence.

"We'll fix that easy enough," he responded. "We'll also tell them that if they attempt to follow us we'll kill the kid, here, and throw his body down to them in proof of the fact that we're desperate men."



Down came the plane in a forced landing

This last argument seemed to convince Scarface, for he pulled a pencil and a piece of paper from his pocket and scrawled the note on the side of Jimmy's plane. Blackbeard thrust a gun in Jimmy's ribs.

"Come on kid," he said gruffly. "You're coming with us."

JIMMY walked silently at the head of the group as they headed for their own plane at the north end of the clearing. His young agile mind was functioning on all six cylinders as he cast about for some means to turn the tables on the enemy.

He was roughly tossed into the rear cockpit, with Blackbeard seated beside him. Scarface took up his position at the controls. The remaining member of the gang had been left with Jimmy's ship. Their plan was for him to walk to the nearest town, obtain fuel, then rejoin his companions at the mountain rendezvous.

Scarface applied expert hands to the throttle, waggled the rudder, and the big Curtiss was off. Jimmy in the rear cockpit watched Blackbeard through narrowed eyes. But the leader of the gangsters of the sky was evidently immersed in his own thoughts. He seemed

to pay no attention to the watching lad at his side.

The germ of an idea began to permeate Jimmy's mind. He tightened the belt of the parachute which he had donned on leaving the camp some two hours ago, and a gleam of hope lit up his gray eyes. He leaned over the cockpit's side, and stared piercingly through the space that enveloped them on all sides.

Far off he perceived a huddle of low gray buildings. He even deciphered some of the enormous black lettering painted on a whitewashed background which informed all the flying world and sundry that these were the premises of the Morgan Flying Field.

HIS heart took on renewed hope as he found himself so near to his flying home. Blackbeard, at his side, was busy thrusting the note that his partner had written in a metal container. Scarface headed the plane for the hangars, which were becoming plainer and plainer as the powerful plane throbbed her way through the air.

Straight toward the field they roared their way. Jimmy's heart raced madly, and his pulse picked up a beat as he contemplated the thing he had decided to do. His hand gripped the belt of his parachute and his eye remained glued on the familiar terrain below.

Blackbeard had the message container ready in his hand. Scarface looked back at him as he winged over the field at a high altitude. The leader of the bandits signalled him to go down lower. Scarface pushed the stick forward and the Curtiss, responding to the inclination of her ailerons, dropped downward, the indicator on her altimeter slowly unwinding itself as the distance between the ship and sea level was speedily reduced.

When the altimeter was something under two thousand feet, Jimmy decided that the time had come for his final desperate gamble to save the day. Blackbeard was leaning over the right-hand side of the rear cockpit, the metal cylinder in his hand. Scarface was giving his entire attention to his instrument board. Jimmy rose to his feet, steadying himself by gripping the back of the pilot's seat.

He clenched his muscular brown fist, and summoning every ounce of strength that his young body was capable of, he swung at the bearded face beside him. Blackbeard slumped over the side for a moment, then recovered. He turned dazedly, his hands upraised. Then he gave vent to a bellow of rage that challenged the roar of the motor.

For Jimmy Webster no longer sat in the cockpit beside him. He was standing on a dangerously slant-

ing wing out of Blackbeard's reach. The latter plunged his hand in his pocket and sought his gun, and at the same time shouted an order in the ear of his pilot. Scarface leveled the plane for a moment, and Blackbeard's finger contracted on the trigger.

Even as Jimmy saw the puff of smoke from the black barrel of the .45, he jumped into the vast, empty realm of space. He felt a burning, stinging sensation in the elbow of his left arm. He counted five between clenched teeth, then fumbled with the rip cord of his chute.

For a moment he was sickeningly aware of the presence of Death. The wind rushed past him with cyclonic velocity. Although he neither saw nor heard him,

he was vividly conscious of the presence of Blackbeard above him, with a flaming .45 in his hand, seeking to send him to the earth a hulk of bullet-ridden carrion.

HE felt a slight jerk as the pilot chute unfolded itself, and billowed out. A second later it dragged the main fabric out behind it. Jimmy felt a terrific jar of his whole body. The straps jerked hard at his armpits and for a moment he winced with the pain. Then, knowing at last that the chute was functioning he directed his gaze upward at the plane of doom above him.

He could make out Blackbeard's swarthy countenance about one hundred and thirty feet above him. Two distended, enraged eyes seemed to glare down from the cockpit's side, the ominous black barrel of the gun before them. Again he saw the (Continued on page 46)



He stood still for a second, ready to jump into that black void beneath him

HOW TO BUILD A Smoke Screen Model Plane

A Snappy Fighter
with
Realistic Camouflage Effect

By
R. W. McCORKLE

See Plans
on
Pages 28 to 33

HERE is a snappy performing fighter which is capable of laying a real smoke screen. The little ship was recently flown in a model exhibition given by the Foothill Aero Club at Ross Field, Arcadia, California, and created much comment about its realistic and spectacular flights. The plane was developed by the author after a series of tests were made to determine the most convenient and yet effective type of smoke screen laying model.

This model was designed to fly a low horizontal course on ten strands of 3/16" rubber while laying the smoke screen, and to duplicate the fast fighting type of performance by simply increasing the power to fourteen strands. Powered with fourteen strands, the model readily makes flights of 300 to 400 feet, reaching an altitude of about 60 feet.

Anyone who is handy at model building can easily duplicate the plane and will find he not only has a ship which performs well but one of trim appearance. An attractive feature of the smoke screen is that any number of cartridges may be made and conveniently carried with which to reload the device as often and as quickly as needed.

The first steps to take in constructing the plane is to lay out the fuselage profile on a flat board and drive brads in along the outline to hold the longerons to the proper curve. Next, insert the struts and cross brace each panel with number thirty-five linen thread as illustrated. The first four panels are triple braced, while the two remaining ones are double braced.

Ambroid all the joints, including the spot where the threads cross. After it is dry, the frame may be loosened from the board by slipping a razor blade between the two if the ambroid has made them stick together. The longerons and struts are 1/8" x 3/16" medium balsa. The tailpost is made of two 1/8" x 3/16" parts,

each half being the rear strut of the fuselage side frames. After two complete side frames are made, join them together with 1/8" x 3/16" struts along the top and bottom, and to the soft balsa nose block in front. Ambroid the two halves of the tailpost together to form one post. Next, shape the soft balsa cowling, which extends from the nose block to the fourth strut on top, and ambroid in place.

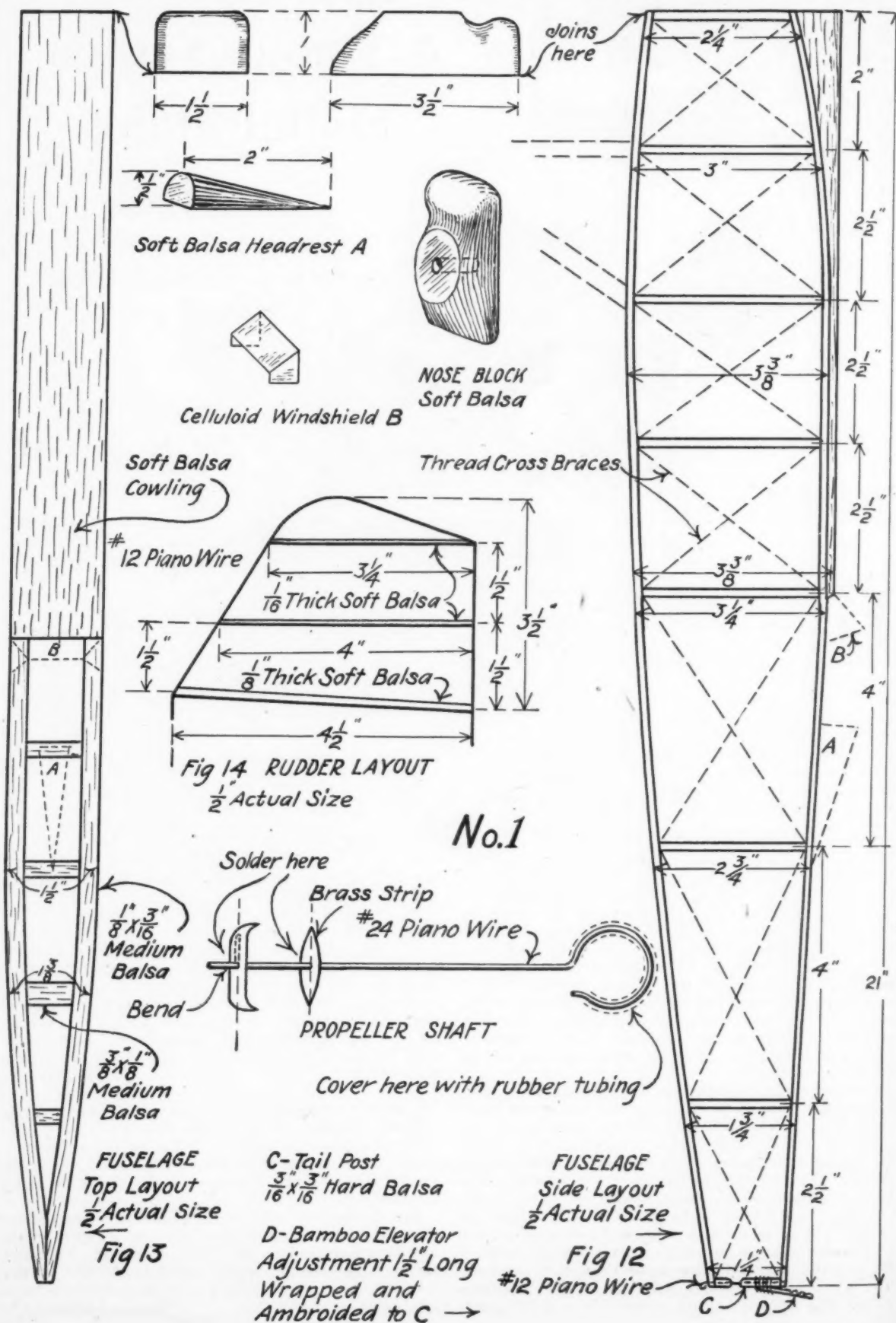
This will greatly strengthen the fuselage and will not add much weight if hollowed out.

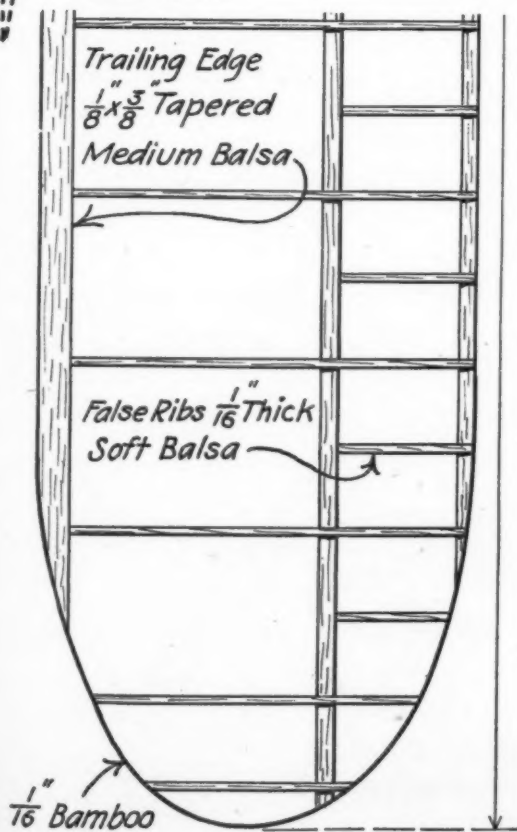
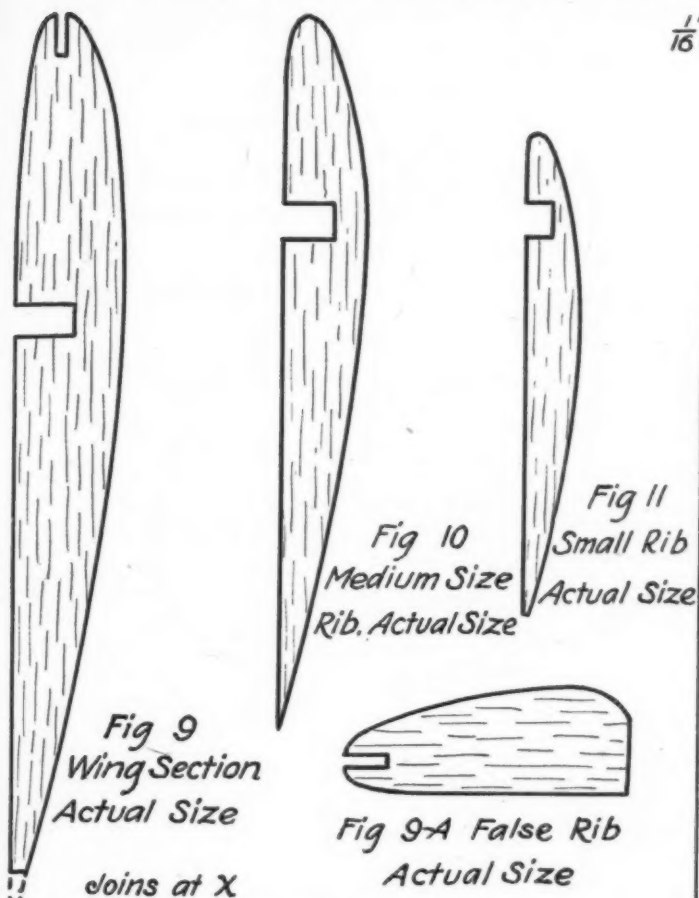
Soft balsa ribs are used in the tail surfaces to keep them very light. This allows the wing to set well forward, improving both looks and performance. The elevator has a bamboo entering edge and a combination number twelve piano wire and soft balsa trailing edge. Note plans. The rudder shape is obtained by a continuous piece of number twelve piano wire, which serves as the entering and trailing edges, as well as the pins used to push into the tailpost and strut to support the rudder.

A PIECE of number twelve piano wire is run through the tailpost and bent at the bottom to form a tailskid, as well as an anchor for the rubber motor "S" hook. Note that part of the tailpost is cut away to expose the wire and thus permit the "S" hook to be attached.

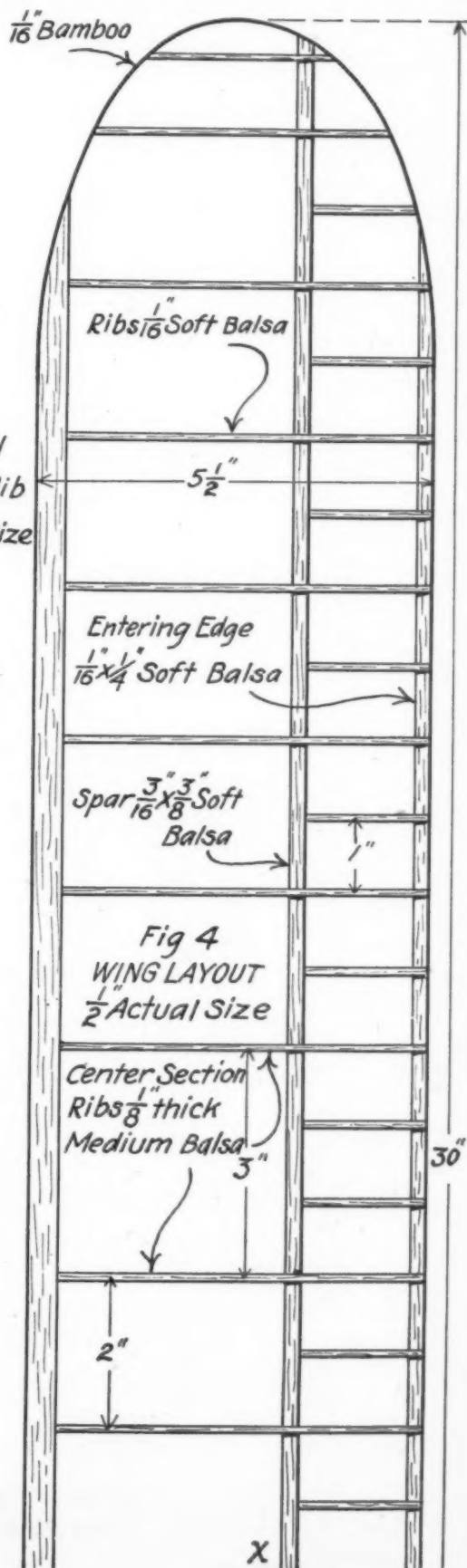
The landing gear is made of number twenty-four piano wire and is wrapped to the two forward struts and longerons and ambroided to secure it. Celluloid fairing strips should be ambroided to the wire struts to give a heavy appearance and to streamline the landing gear.

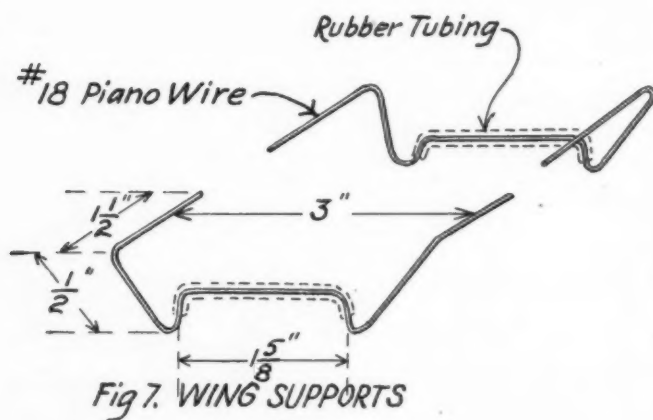
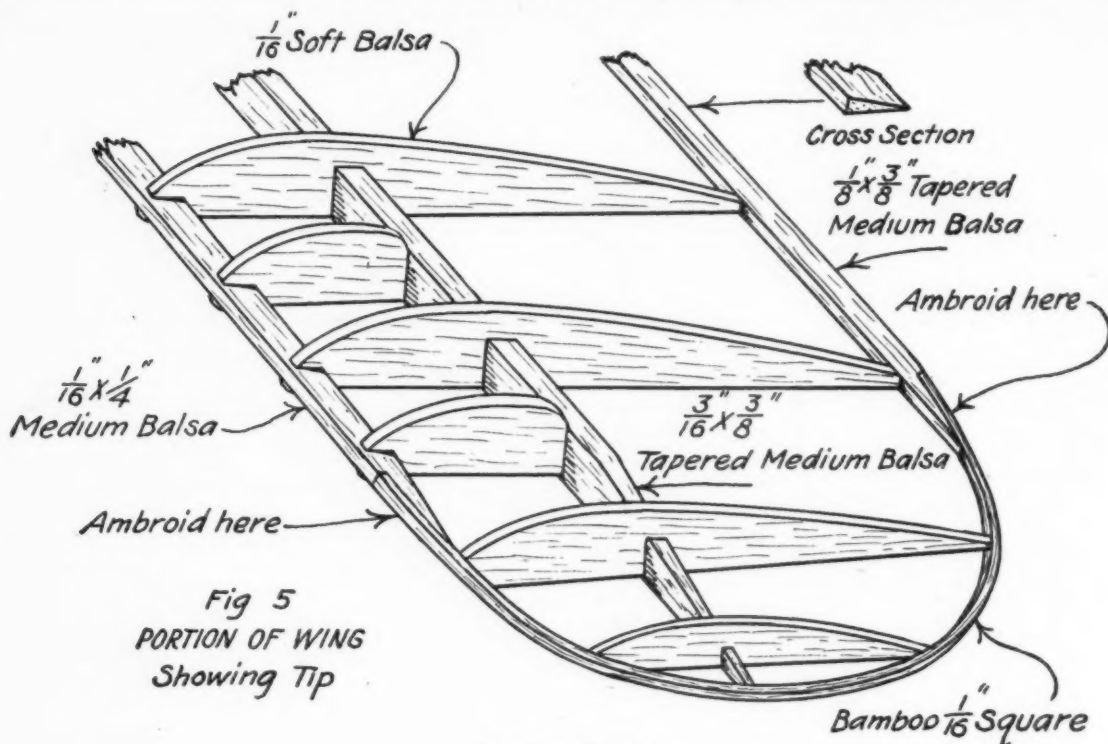
(Continued on page 44)



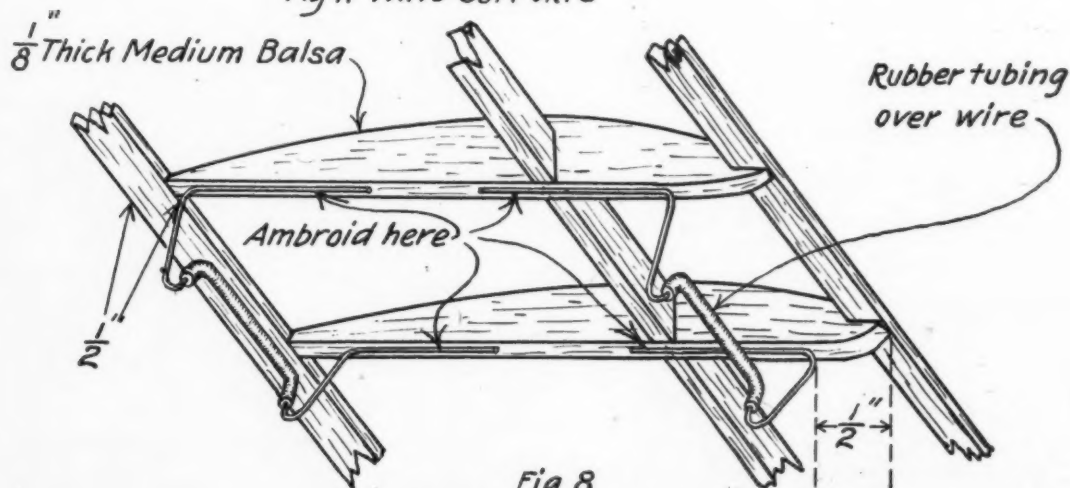


No. 2





No. 3



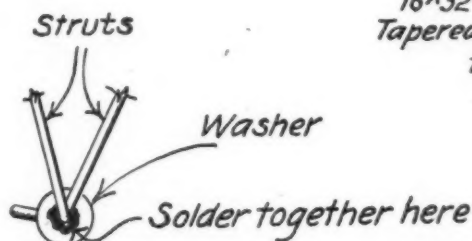
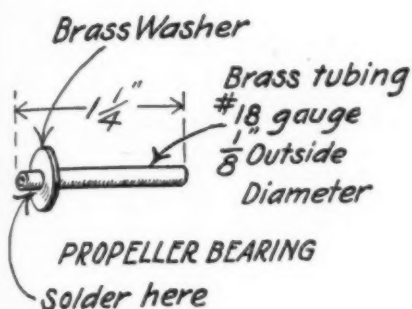
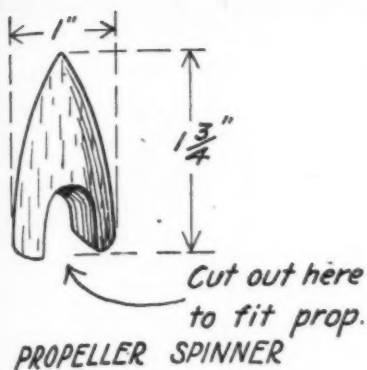


Fig. 18

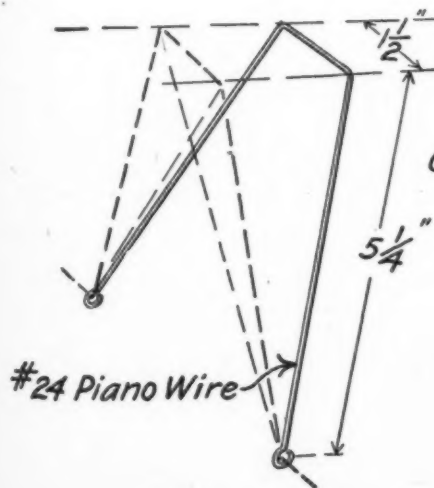


Fig. 19
 REAR STRUT

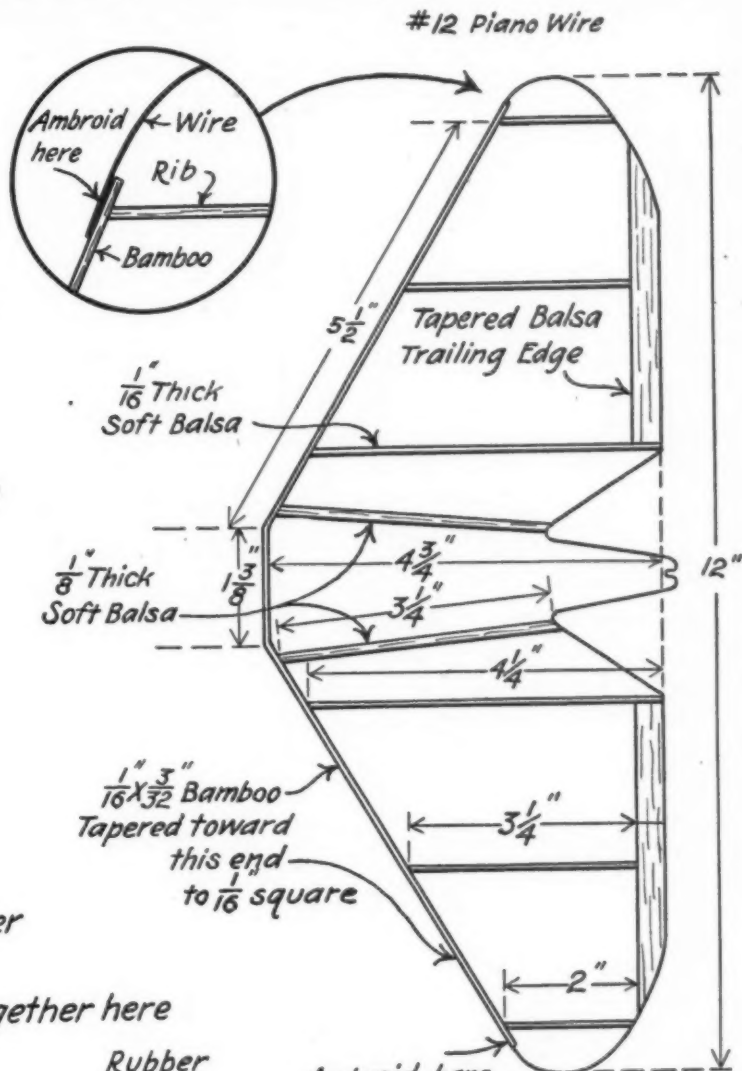


Fig. 15 ELEVATOR LAYOUT
 1/2" Actual Size.

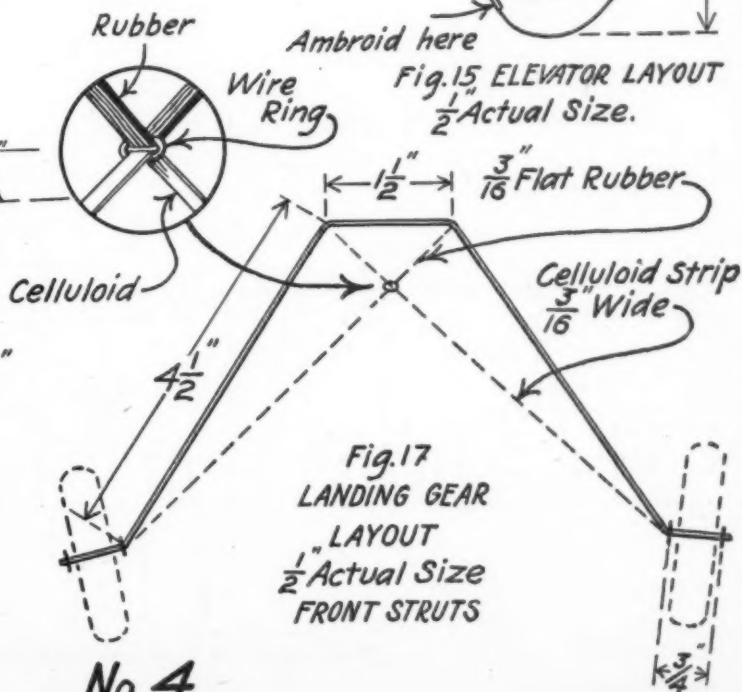
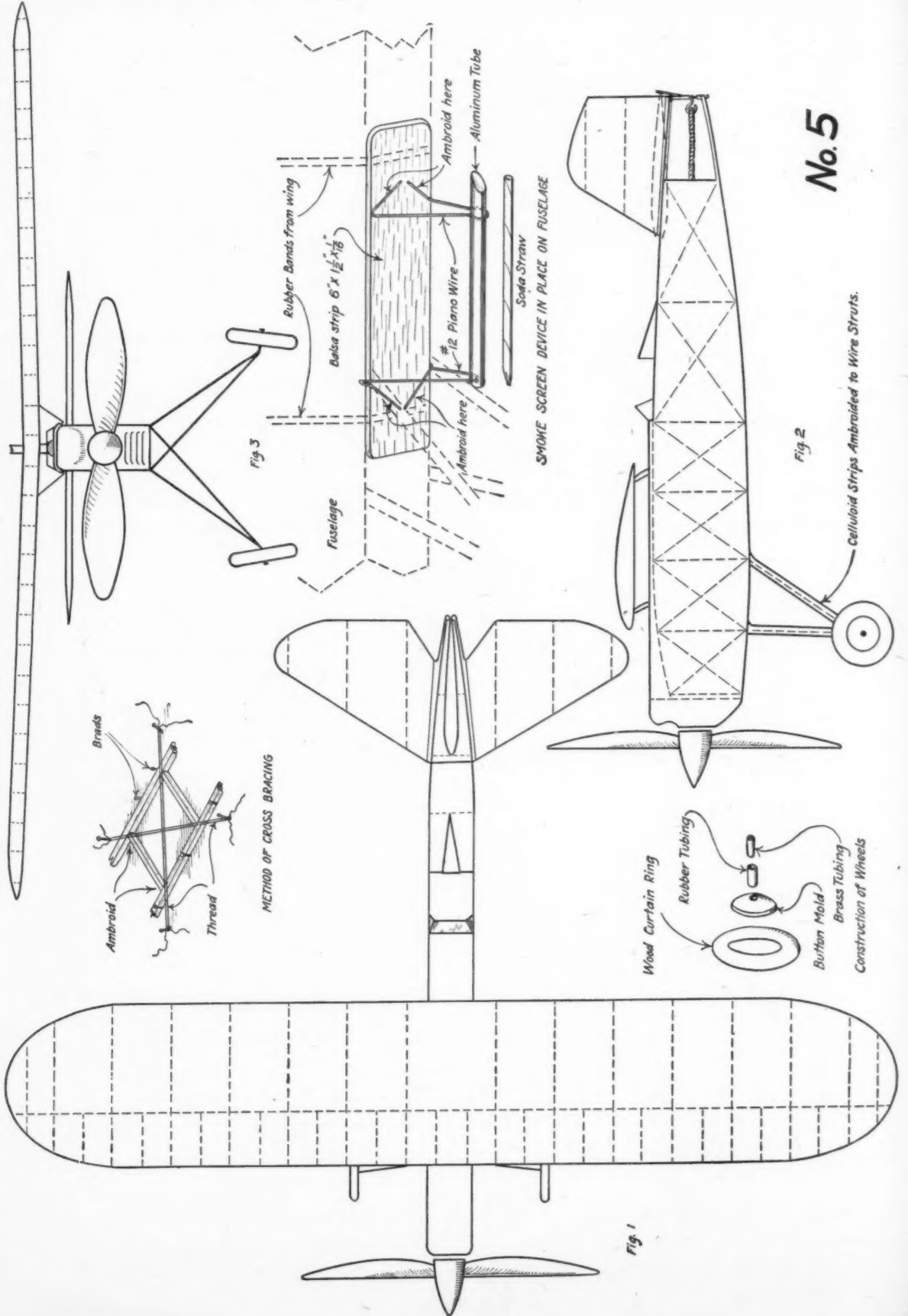
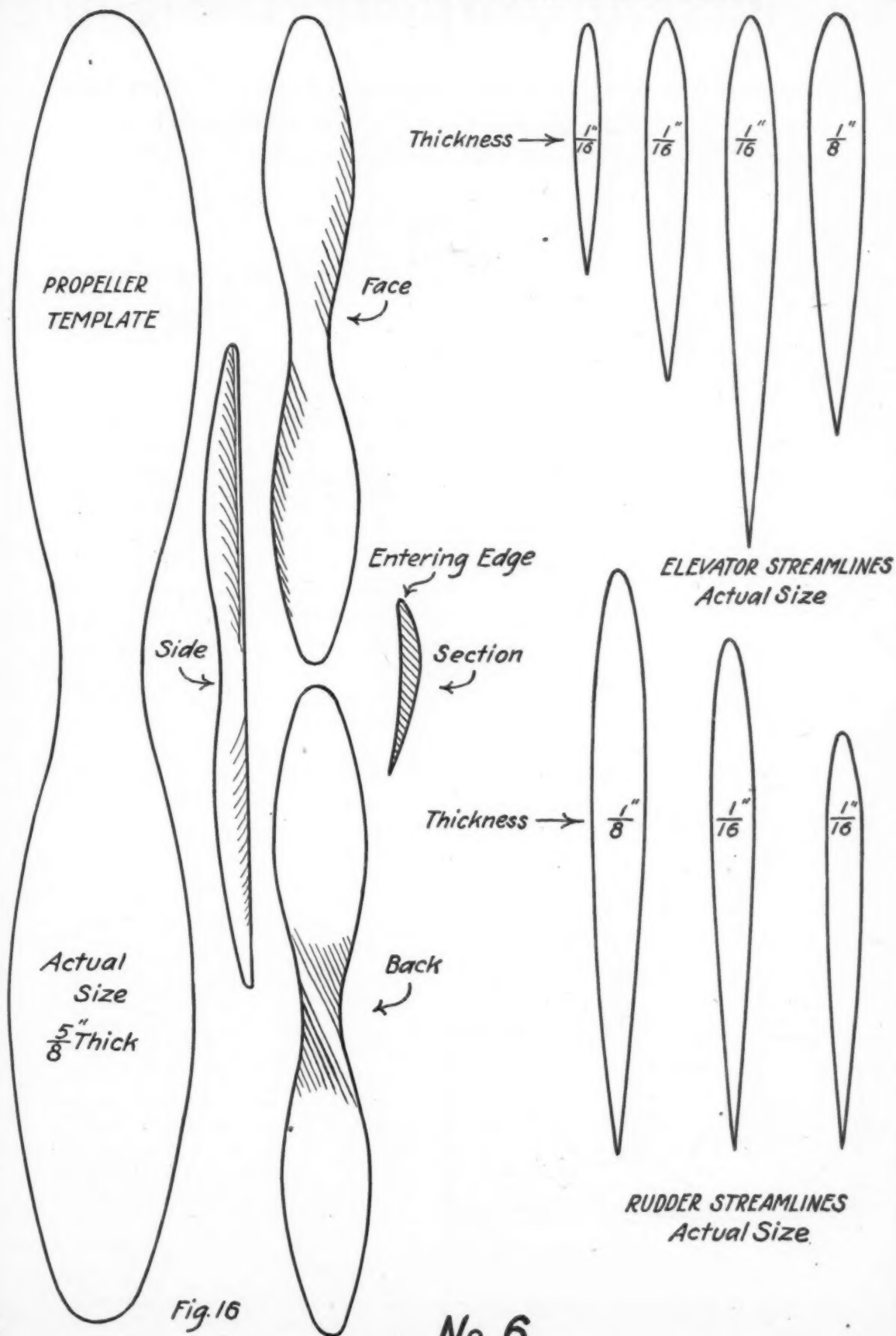


Fig. 17
 LANDING GEAR
 LAYOUT
 1/2" Actual Size
 FRONT STRUTS

No. 4

No. 5





A Course in Airplane Designing

By Mastering This Valuable Course, the Model Builder of Today Lays
the Cornerstone for His Career as the Aeronautical
Engineer and Designer of Tomorrow

By **KEN SINCLAIR**

Article 9.

IN presenting this course, MODEL AIRPLANE NEWS wishes to stress the fact that model building is more than a mere sport. If the builder of model airplanes learns the fundamental principles underlying airplane flight and designing, he prepares himself for a future career in the most profitable phase of aviation.

The policy of MODEL AIRPLANE NEWS is not to encourage or teach its readers to become pilots, but rather to become aeronautical engineers, designers, salesmen, manufacturers, or equip themselves for any other positions which require the training of the specialist or executive. Study this course from month to month, master it in every detail and you will gain a fundamental knowledge of the how and why of airplane design which will be second to none.

THE EDITOR.

IN the last article we dealt with the flow of air around a wing section, a circular body, and a streamline. Now we shall apply what we learned to the actual parts of the airplane and, finally, to the complete airplane.

First let us consider the complete wing. We found in the preceding article that the wing produces lift by forming a partial vacuum on the upper surface, as well as by the pressure of the air stream on the lower surface. How does the air flow around the wing as a whole? Since we cannot see the air flow, we must deduce the answer to that question from what we already know about the air. We have found that air flows in

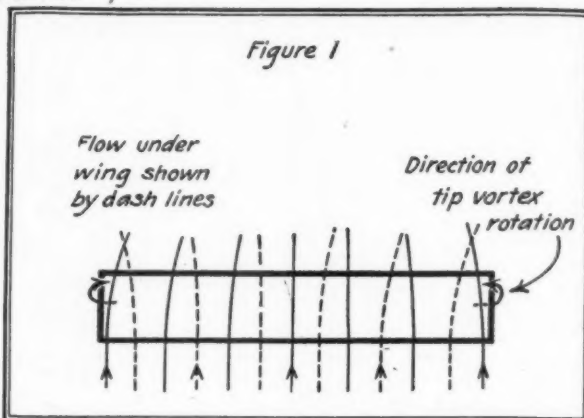


Figure 1

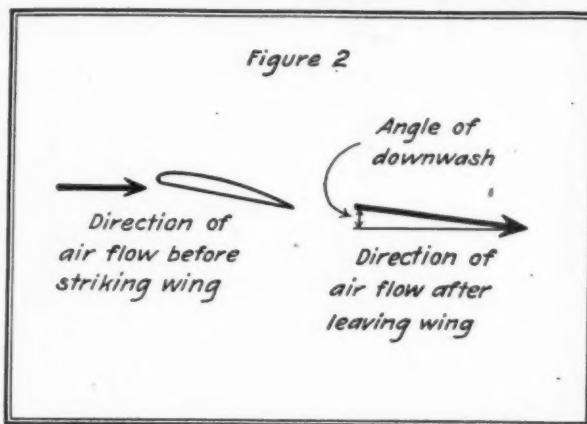


Figure 2

the same way as a fluid does. That means that if we have a region of low pressure near a region of higher pressure, the air will flow from the high pressure region to the low pressure region. Considering our wing, we have at the tip a high pressure region below the wing and a low pressure one above it. How will the air flow? Logically, it will flow upward around the wing tip. But here the speed of the ship as it passes through the air must be taken into consid-

eration. The air that is flowing upward from the bottom of the wing never actually reaches the top of the wing, but streams out behind the wing, forming a whirling vortex that causes induced drag. As shown in Figure 1, the air stream over the entire top of the wing is pulled toward the center by the vacuum, while the stream beneath the wing is pushed outward toward the wing tips. The action between these two layers of air, moving in different directions, adds to the wing tip vortices and probably adds to the total induced drag of the wing.

If we have a wing of low aspect ratio, it is evident that the air will be affected by the vacuum and pressure areas of the wing for a longer time than it would by a high aspect ratio wing. Thus it is that the low aspect ratio wing is less efficient than the high aspect ratio wing; it has more vorticity behind it, and hence more induced drag.

The German sail planes are excellent examples of high aspect ratio wings and aerodynamics efficiency. They are streamlined to the last degree so that there will be little disturbances (Continued on page 48)

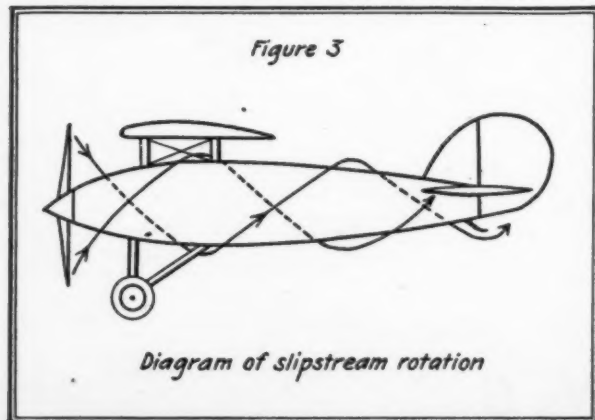
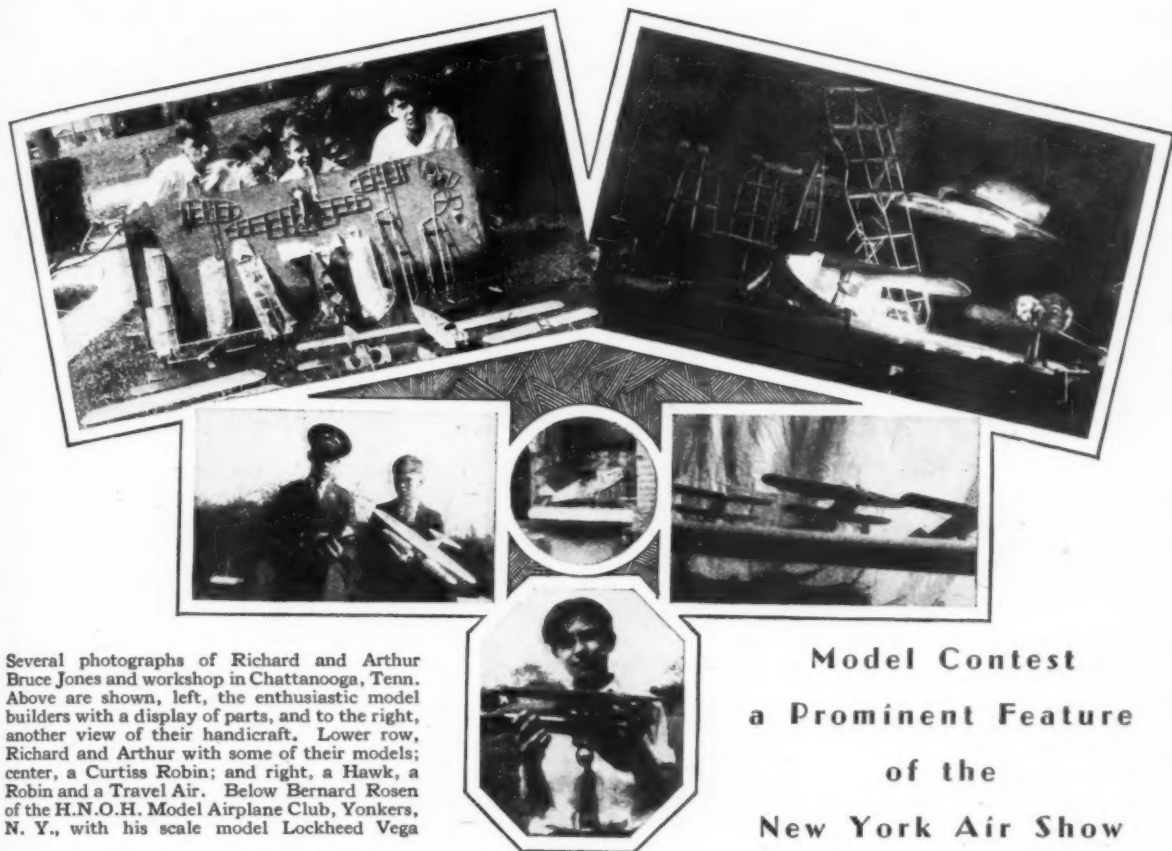


Figure 3

Diagram of slipstream rotation

The American Sky Cadets



Several photographs of Richard and Arthur Bruce Jones and workshop in Chattanooga, Tenn. Above are shown, left, the enthusiastic model builders with a display of parts, and to the right, another view of their handiwork. Lower row, Richard and Arthur with some of their models; center, a Curtiss Robin; and right, a Hawk, a Robin and a Travel Air. Below Bernard Rosen of the H.N.O.H. Model Airplane Club, Yonkers, N. Y., with his scale model Lockheed Vega

Model Contest a Prominent Feature of the New York Air Show

THE New York Aircraft Salon, the greatest Air Show that the city has ever seen is over and now we are trying to get back to normal after a wonderful week.

With the American Sky Cadets, it started weeks ago when the Aeronautical Chamber of Commerce decided to hold a contest for boys and girls as part of the show and put the full arrangements for the contest in our hands.

A Committee was immediately formed under the Chairmanship of Mr. E. J. Moriarty, Assistant-Administrator of the American Sky Cadets. Other members of this Committee were Mr. Norman Siegel of the Aeronautical Chamber of Commerce, Mr. D. H. Deboskey of Avio, Mr. Lawrence Shaw of the Graphic Junior Aviation Club, Mr. G. Anderson of Junior Aviation League of New York, Mr. George P. Coe of the Legion Air Cadets and Mr. Henry T. Vance of the New York Boys' Club.

In this way all organizations interested in the advancement of aviation among our boys and girls were represented. In view of the short time at our disposal, it was decided to make the contest as simple as possible. Three types of models were allowed. Stick Model R. O. G., Commercial Type R. O. G. and Scale Models.

The contest was open to all boys and girls under twenty-one years of age with the two divisions of Senior and Junior. Owing to the large number of entries, more than 600, elimination contests were held in Manhattan, Brooklyn and the Bronx, with the finals in Manhattan.

First and second place winners from the elimination contests with the addition of out of town members

representing their club or city, met for the finals in the flying contest on May 3 in the 165th Regiment Infantry Armory.

Scale models were displayed at Gimbel Bros., and were judged there on May 2. The eliminations in Manhattan were conducted by Mr. Anderson of Junior Aviation League, in Brooklyn by Mr. Powell of Abraham & Straus and in the Bronx by Mr. Bulger of the A. A. C. Model Aircrafters. In the finals the officials were as follows: Judge, Mr. E. J. Moriarty; Timers, Messrs. Anderson, Powell, Newmart and Bulger.

The 165th Regiment Infantry Armory, owing to its size and absence of girders, is ideal for indoor flying. The contestants were at the top of their form as may be judged by the excellent flights that were made. At the end of this article will be found the list of prizes and prize winners with their times.

AT the request of the Air Show Committee, American Sky Cadets models were put on display in different display windows in New York by companies tying up their displays with the Air Show.

On May 3 the Air Show officially opened. At noon New York witnessed the greatest commercial mass formation flight in the history of aviation, when seventy-seven commercial planes ranging from twenty-passenger transports to single place sport planes, took off from the Curtiss-Wright Airport at Valley Stream, L. I., for an hour's flight over New York City and surrounding territory. The story of the flight was broadcast from coast to coast by arrangement of the Columbia Broadcasting System and the National Broadcasting Company.

The assembling of the seventy-seven planes was undertaken at a moment's notice by the Curtiss-Wright Company, when it became apparent that the Army Air Corps planes would not be able to reach New York in time for the aerial demonstration. Some of these planes were flown to New York from airports within a radius of 400 miles of the city, and demonstrated the facility with which a civilian air force could be assembled.

The doors of the show at Madison Square Garden opened at six o'clock. The official opening was made at eight o'clock by the then Police Commissioner Grover A. Whalen, who was accompanied by his Aviation Aid Rodman Wanamaker 2nd; Capt. Arthur W. Chamberlain, secretary, and Capt. Arthur W. Wallander, head of the Police Air Force.

AMERICAN SKY CADETS' BOOTH

At the American Sky Cadets' booth, were shown the prizes donated by various organizations and the winning models, also, the MODEL AIRPLANE NEWS Curtiss "Robin" built by William Grunstra of Clifton, N. J.

This model, which was entered for MODEL AIRPLANE NEWS contest, had been disqualified as it was a non-flying scale model, but received a special prize through the courtesy of MODEL AIRPLANE NEWS.

Grunstra's model was entered in the New York Air Show contest where it easily carried off the first prize. The judges of the scale models of the New York Air Show were Mr. C. S. (Casey) Jones, President of the Curtiss-Wright Flying Service; Mr. Augustus Post, noted model airplane authority; Capt. H. J. Loftus-Price, Editor, MODEL AIRPLANE NEWS; Mr. Frank A. Tichenor, President, *Aero Digest*; Capt. Lewis A. Yancey, famous New York to Rome flyer; Mr. George F. McLaughlin, Editor of *Aero Digest*, and Mr. Charles Grant of the Grant Aircraft Co., Keene, N. J.

Grunstra had put in three months' steady work on his model and the interest displayed and the high praise given the model by aviation engineers and aviators at the Air Show, fully repaid him for his great work. All week a steady stream of aviation experts came to the American Sky Cadets booth to look at the model.

Mr. Casey Jones and the staff of the Curtiss-Wright Flying Service were especially interested in this and the other Curtiss "Robin" models and through the courtesy of Mr. Earl E. Hughes, Manager of Sales Promotion of the Wright Aeronautical Corp., the six prize winners of the Curtiss "Robin" contest were awarded flights. Mr. Hughes will be touring the country and the winners have been advised that he will take them up when he reaches their several districts.

Some excellent models built by William Morrison, aged 14, also attracted attention; not only does he make his own models, but also scales down his own plans.

Among distinguished visitors at the American Sky Cadets booth were Mr. Bernarr Macfadden, Mr. C. S. (Casey) Jones, President of Curtiss-Wright Flying Service; Mr. Roger Q. Williams, Capt. Lewis A. Yancey, trans-Atlantic flyers and Division Commanders of American Sky Cadets; State Senator J. Griswold Webb, N. Y. State Aviation Commissioner; Mr. Frank A. Tichenor, President of *Aero Digest*; Mr. H. J. Porter of the Texas Company; Capt. Potter of the Royal Air Force; Mr. W. Hawley Bowlus; Mr. Giuseppe Bellanca, famous airplane designer; Dr. Vought, of the Chance-Vought Corporation, and Capt. Frank Hawks.



Sky Cadet Joseph Friedland of Brooklyn, N. Y., with his 2 ft. scale model of a Curtiss Army Hawk

THE SHOW ITSELF

The programme for the week, which will give some idea of the scope of the show, was as follows:

May 3rd—Official Opening—an outline of which has already been given.

May 4th—Educational Day—dedicated to professors, instructors and pilots, who are devoting their careers to the proper education of American youth in aeronautical education. Among the speakers were Prof. Roland H. Spaulding, Educational Specialist of the Daniel Guggenheim Fund Committee of Elementary and Secondary Aero-

nautical Education and Lieut. Commander John W. Eiseman, Commander of the Third Naval Training Squadron, Rockaway Beach, L. I.

Prof. Spaulding stressed the value of aeronautical education for people in general, so that the public may be brought to realize the possibilities of airplanes for transportation and the advances that have been made in safety appliances, all of which were the many purposes of the New York Air Show.

Commander Eiseman spoke of the aeronautical education being carried out by some of the great newspapers that featured aviation news and also referred to the educational value of air shows.

May 5th—was the Air Mail Pilots' Day, when many air mail pilots were the honored guests.

May 6th—Famous Flyers Day featured a talk by Roger Q. Williams, famous New York to Rome flyer.

Mr. Williams in his address gave an outline of his momentous and exciting career, comprised of test flying, instructing, stunting, barnstorming and culminating with his world famous flight across the Atlantic to Rome with Capt. Lewis A. Yancey as navigator.

May 7th—International Day when practically every nation was represented by either a flyer or a mem-

National Model Airplane Championship Meet

A national championship model airplane meet will be held August 23 to September 1 at Curtiss-Wright-Reynolds Airport, Chicago, in conjunction with the 1930 National Air Races. Joseph J. Lucas of Chicago, national outdoor flying champion, is chairman of this event. Mr. Lucas is a pioneer model designer.

Elimination contests will be organized in cities throughout the country. All builders and flyers are urged to participate. Information regarding qualifications and regulations may be obtained by writing to Joseph J. Lucas, c/o National Air Race Committee, Room 295, Hotel Sherman, Chicago, Illinois.

The national finals will be held during the air races.

ber of the Diplomatic Corps. The afternoon programme was opened by Maj. Georges Thenault, French Air Attache and war time commander of the famous Lafayette Escadrille, which ought to have a special place of honor in the heart of every American boy.

In the morning New York received one of the greatest thrills in its history when the Naval aircraft squadrons attached to the fleet anchored in the Hudson River, staged an aerial attack over the city. No less than 162 planes were in the air over the town carrying out maneuvers with wonderful precision. New York, so used to thrills, was jolted out of its thrill-weary attitude. Here was something new!

No parade up Broadway, no ticker tape to throw from office windows. What would have been the use? Instead of gazing down on world-famous men or women taking their tribute for achievement, we now gaze up at man's triumph over all natural laws.

Just to be looking up is surely a symbol of the future! As we gaze up at those unknown heroes of the Fleet, whose faces are unfamiliar to us, whose pictures will be missing from the front page of the morning papers and whose names even, are unknown to us, but who, while carrying out their intricate movements, diving with roaring engines, banking, zooming—all as part of their day's work, there are few of us, if any, who are not thrilled by the feeling of pride that we, too, like them, are men and have the same chance of achievement.

What a lesson for our wet blankets whose voices are continually raised to proclaim the dangers of flying! For two days, 162 planes maneuvered over New York with a trip to New England and Washington sandwiched in between, with only one forced landing by a plane

for gas and repairs which only took a few minutes.

May 8th—Transportation Day with addresses by personages in the fields of rail, water, automotive and air travel.

May 9th—Army-Navy Day—when the members of the services were the honored guests of the Air Show management. Speeches were made by prominent officials of the Army and Navy.

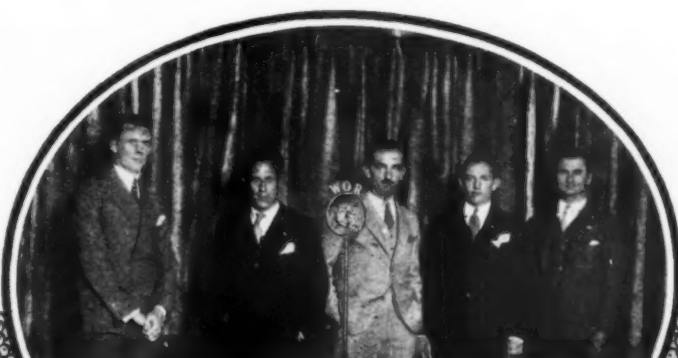
May 10th—American Youth Day—Officially dedicated by the Aeronautical Chamber of Commerce to "Youth, whose faith in the new and apparently impossible, has been responsible for civilization's great strides." A dedication of which every boy and girl ought to feel proud.

THOUSANDS of youngsters from New York and nearby cities took advantage of the opportunity to emulate their aviation heroes.

Climbing in and out of cockpits of colorful sport planes or sitting in the control cabins of the big air liners, hundreds of boys and girls had an opportunity to picture themselves on some fantastic flight to world fame. All planes from the largest to the smallest were thrown open to the thousands of youngsters who stood in line for an opportunity to bounce themselves on the soft cushions of the passenger cabins or to sit at the controls.

The steady stream of youngsters, many of them accompanied by parents or

(Continued on page 56)



A happy group of Bamberger model builders shown at the inauguration of the club in Newark recently. In the oval are shown, left to right, Lieut. Aldsworth, Capt. Frank Hawks, J. D. ("Duke") Jernigan Jr., Major George Vaughan and Capt. John O'Donaldson



MACFADDEN AVIATION ADVISORY BOARD

Conducted by
Capt. H. J. LOFTUS-PRICE
 (Ex-Royal Air Force)



**CHAIRMAN
 OF THE BOARD**

WITH so many of our readers asking individually what is this record or what is that record, I think I will kill a few thousand birds with one stone by publishing all of the official world air records to date. This will save a lot of time and trouble and it might be worth clipping the records for your scrap book, adding to them yourselves if and when any new records are created. The full list of official world air records is as follows:

Airplanes

DURATION, without refueling: 67 hours, 15 minutes.

Made by Major Umberto Maddalena and Lieut. Fausto Ceconi, both of Italy, in a Savoia-Machetti, May 31, June 1 and 2, 1930.

DURATION, refueling in flight: 420 hours, 17 minutes.

Made by Dale Jackson and Forrest O'Brine of the United States at St. Louis, July 13-30, 1929, with a Curtiss "Robin".

DISTANCE, closed circuit: 4,763.7 miles.

Made by Arturo Ferrarin and Carlo del Prete of Italy, May 31, June 1 and 2, 1918, with a Savoia-Marchetti plane.

DISTANCE, airline: 4,948.59 miles.

Made by Coste and Bellonte of France, from Le Bourget to Coulart, China, Sept. 27, 28 and 29, 1929, with a Breguet 19.

DISTANCE, refueling: 3,203.26 miles.

Made by Lieuts. Smith and Richter of the United States at San Diego, Cal., Aug. 27 and 28, 1923, with a DH-4B Liberty.

ALTITUDE: 41,794 feet.

Made by Willi Neuenhofen of Germany at Dessau, May 25, 1929, with a Junkers W-34.

MAXIMUM SPEED: 278.48 miles per hour.

Made by Adj. Bonnet of France at Istres, Dec. 11, 1924, with a Ferbois monoplane.

TRANS-CONTINENTAL, non-stop flight: 17 hrs., 38 min., 56 sec. Made by Capt. Frank M. Hawkes, June 27 and 28, 1929, with a Lockheed "Air Express".

TRANS-CONTINENTAL, one-stop: 14 hrs., 45 min., 32 secs.

Made by Col. and Mrs. Charles A. Lindbergh, April 20, 1930, with a Lockheed "Sirius".

Seaplanes

DURATION: 36 hours, 1 minute.

Made by Lieuts. Arthur Gavin and Apollo Soucek of the United States at Philadelphia, May 3, 4 and 5, 1928, with PN-12.

DISTANCE: 1,569 miles.

Made by Lieuts. B. J. Connell and H. C. Rodd of the United States at San Diego, Cal., Aug. 15 and 16, 1927, with PN-10.

DISTANCE, Airline: 1,841 miles.

Made by Commander John Rodgers and Lieut. B. J. Connell of the United States from San Pablo Bay, Cal., to near Hawaii, Aug. 31 and Sept. 1, 1925, with PN-9.

ALTITUDE: 38,549.84 feet.

Made by Lieut. Apollo Soucek of the United States at Washington, D. C., June 4, 1929.

MAXIMUM SPEED: 357.723 miles per hour.

Made by Squadron Leader A. H. Orlebar of England, Sept. 12, 1929, with a Super-marine Rolls Royce S-6.

Glanders

DURATION: 14 hours, 7 minutes.

Made by Ferdinand Schulz of Germany, May 3, 1927.

DISTANCE over closed course: 283.22 miles.

Made by Ferdinand Schulz of Germany, May 3, 1927.

EACH month the Macfadden Aviation Advisory Board will endeavor to answer all questions concerning model building and aviation in general. Address all questions to

The
 Macfadden Aviation Advisory
 Board,
 MODEL AIRPLANE NEWS
 1926 Broadway,
 New York City

Enclose with your letter a self-addressed and stamped envelop to facilitate an answer, as space is limited and all letters can not be answered in these pages.

DISTANCE in straight line: 44.86 miles.

Made by Johannes Nehring of Germany, April 25, 1929.

SPEED over closed course: 33.892 miles per hour.

Made by Ferdinand Schulz of Germany, May 5, 1927.

ALTITUDE above starting point: 3,940 feet.

Made by Johannes Nehring of Germany, April 25, 1929.

There are one or two unofficial records which might bear notation, as follows:

Jack Barstow at San Diego soared over Point Loma for 15 hours, 13 minutes in a sail plane. Unfortunately for Barstow, no barograph had been installed in the sail plane; hence he was robbed of official recognition.

Then there is the record of Robert Kronfeld, one of Germany's outstanding gliding pilots, who, early in the year in a Vienna type sail plane, reached an altitude of 7,000 feet and in a non-stop flight landed 93 miles from his starting point.

Another unofficial sail plane record is that of 14 hours, 45 minutes, established by Lieut. Dinert of Germany.

The Caterpillar Club seems an extra attraction, so far as readers have indicated during the past weeks, so, to repeat the Air Corps News Letter remark concerning this, the Caterpillar Club is increasing by leaps.

Recently it was stated that the membership of this mythical organization had increased to 214, with a total of 223 emergency jumps. Within the space of a few weeks eleven new members, as far as is known, have joined the club and one member, Mr. Harry Sievers, air mail pilot, joined the ranks of those holding second degrees.

Delving into the records of the Caterpillar Club, it has come to light that one other member, Mr. Ernest E. Dryer, is also entitled to a second degree rating. This gentleman claims that in November, 1927, in New Mexico, he made an emergency jump when a wing came off an OX-5 Standard plane during a test flight and that the same thing happened several months later in February, 1928, at Ypsilanti, Michigan, when stunting a Waco-9 plane.

At this writing, therefore, there are recorded in the Golden Book of

(Continued on page 53)

How to Build a Weather Vane

Novel Plane Ornament for

Your Garden Is Easy to Construct

By E. W. FRANKLIN

WEATHER vanes have been in use for countless

ages and in almost every shape imaginable. Until the airplane was invented the most appropriate shapes were birds, as they did not seem out of place perched on top of a mast. The shape most used was the cock. They are sometimes called weather-cocks. Silhouettes of different birds made fine appearing weather vanes, but it does seem rather queer to see a locomotive or ship in such a position.

The airplane model makes the most natural weather vane and windmill as the complete model can be used, thus giving it a natural appearance from all directions (which is not true of a silhouette) and as the wind spins the propeller it has the appearance of the real thing.

Now that we are building airplane models why not dress up the airport and have a ship or two in the air all the time? And, believe me, a great many of the older folks get a kick out of seeing them, too.

They are simpler and easier to build than many models although the construction is somewhat different.

As they must be built to stand all kinds of weather they must be more rugged, but as weight makes little difference we can use heavier wood, and make the fuselage, wings and tail surfaces of solid wood similar to many scale models.

As mahogany is sometimes difficult to obtain, the best common wood for this purpose is white pine, although most any wood will do providing it is not glued and is well protected with paint. White pine will be least likely to warp, and is easily worked.

For the body of the plane or fuselage we will need a piece of ordinary 2" by 4", 10 1/4" long. This lumber comes in a number of different woods, mostly soft, such as fir and pine. Try and obtain a soft, straight and close-grained piece without pitch. If it is heavy with pitch it will be hard to work and paint will not hold as well. If it should be dressed or planed you may find that it measures only 1 1/2" in thickness, but this can be used as this slight difference will not affect the appearance of the plane.

This piece must be shaped as shown in drawing 2 with top and bottom nicely rounded and cut away to fit in the wings and elevator. The wings are made in one piece 18" long 3 1/2" wide and 1/4" thick. If you have any difficulty in obtaining this thin stock your grocer or fruit dealer will probably be glad to give you a fruit crate, many of which are made of thin pine. This is cut to shape as shown in drawing 1, and the edges thinned down all around except where it joins the fuselage.

Always sandpaper all parts smooth before nailing together. After wings are nailed in place a hole must be drilled at point indicated in drawing 2 for the pivot. As it may not be possible to obtain a nail long enough for this, a piece of stiff wire 4" long and about 1/16" in diameter, sharpened at one end, may be used. Hole drilled through wing and fuselage must be large enough to allow plane to turn freely on the wire.

Then of the 1/4" stock make the tail surfaces shown in drawing 3 thinning the edges except where they join together. Take particular

notice that the elevator must be nailed to the rudder first and then both nailed to fuselage as drawing shows.

Then cut two 1" wheels rounding the edges as shown in drawing 2. Make four of wing brace A and two each of wheel

struts B and C. These are nailed to wheels and fuselage as shown in drawing 2. The position of strut C can be seen in small sketch in drawing 3.

In nailing different pieces together a very thin brad or nail must be used similar to those used in making cigar boxes, and great care must be taken not to split the wood.

Tail skid is made of 1/8" square piece 1 1/2" long and one piece 1/2" long nailed as shown in drawing 2.

Drawing 2 shows propeller and block. You will notice that this is shaped like an ordinary airplane propeller and is not an efficient propeller for flying models, but it is the appearance we want in this case. After cutting propeller to a shape drill the center hole large enough to fit loosely on a nail about 1 1/2" long and drive in front end of fuselage at place indicated in drawing 2, placing a couple of small washers on the nail between propeller and fuselage.

Now the plane should be well painted, at least two coats, preferably more. Fill all open cracks. Lacquer is very good.

The appearance depends a great deal on the paint job. A blue fuselage, blue fin and stabilizer, blue wheels with yellow tires. Yellow or orange wings, rudder, elevator, tail skid and struts make a beautiful combination.

LINES should be scratched or cut in with a knife blade to indicate the ailerons, elevator, and rudder so that after painting they can be striped with a small stripping brush.

If vane is to be mounted low where they can be seen, the license numbers and other insignia make it appear more realistic.

After the plane is thoroughly dry see that the propeller turns very freely and mount on pole by driving in the pivot pin with a small washer on top and two between fuselage and pole, swage top of pin to hold washer on, taking care to leave free enough to rotate.

When this is done the pole may be nailed to any small building, on a larger post or even on a fence.

Possibly there will be some who prefer a particular make of plane to this model. In this case you can use the construction described above, shaping fuselage, wings and tail surfaces to conform to the model desired. Models of the tri-motored planes would be very effective as they would have three propellers spinning.

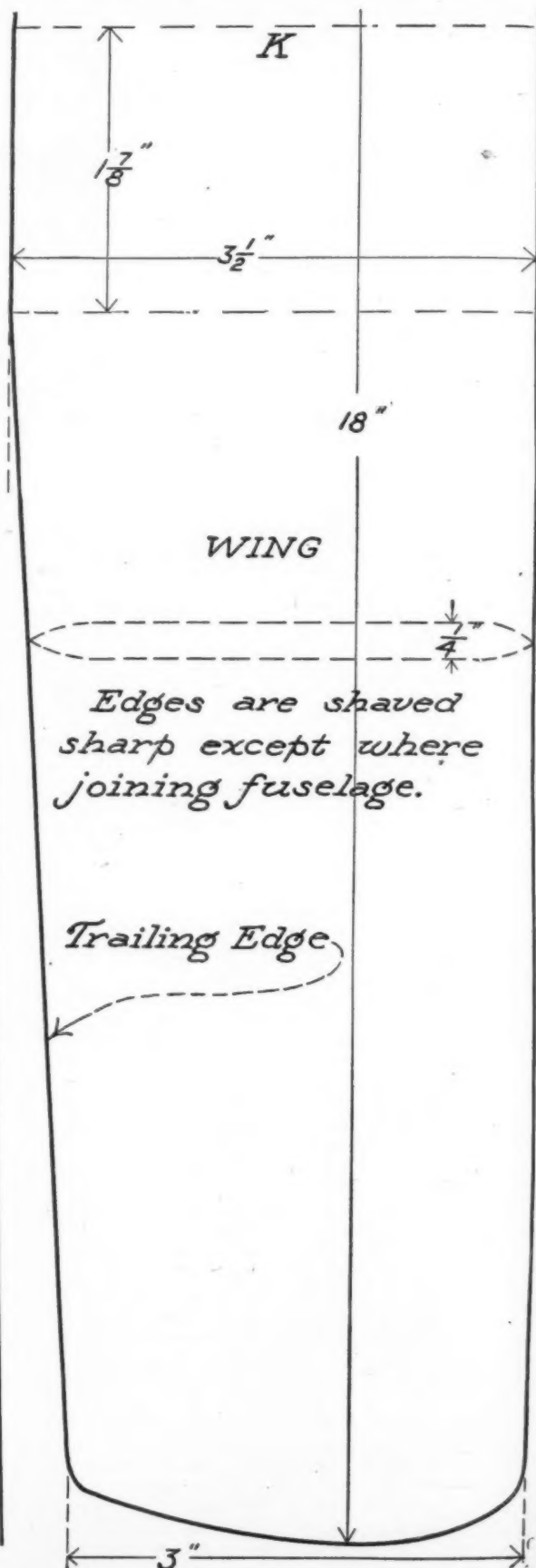
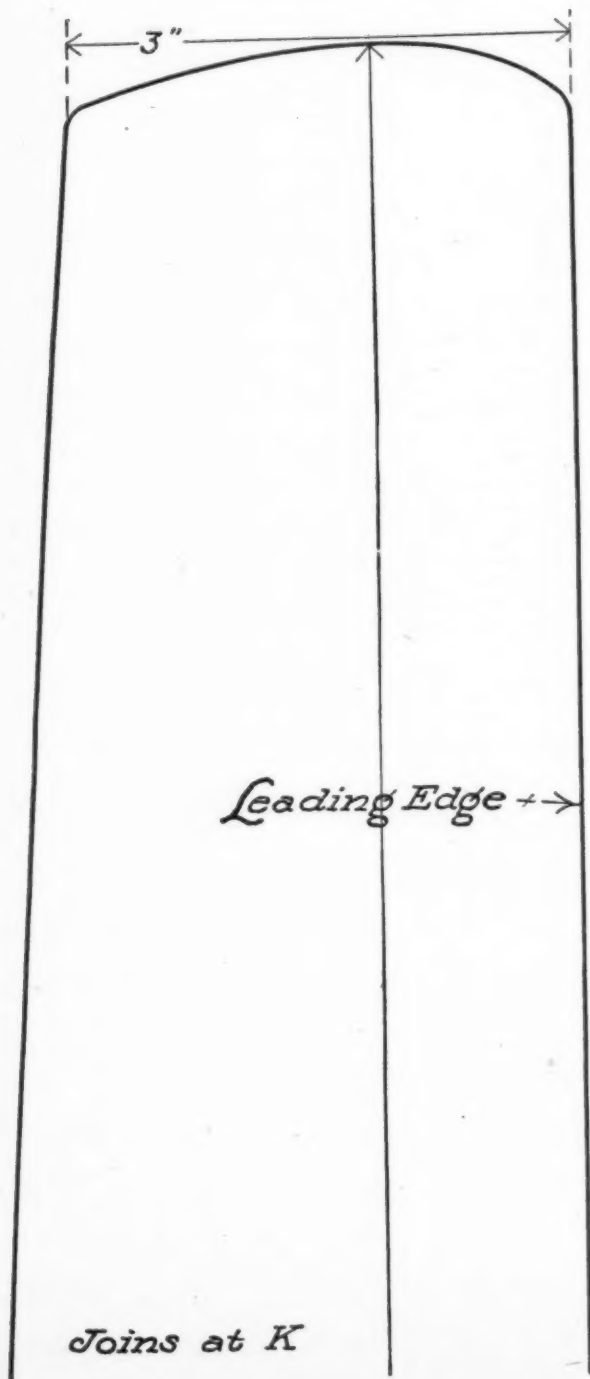
Propellers can also be made of sheet aluminum if desired, cut to shape of drawing and drilled for the nail to serve as shaft.

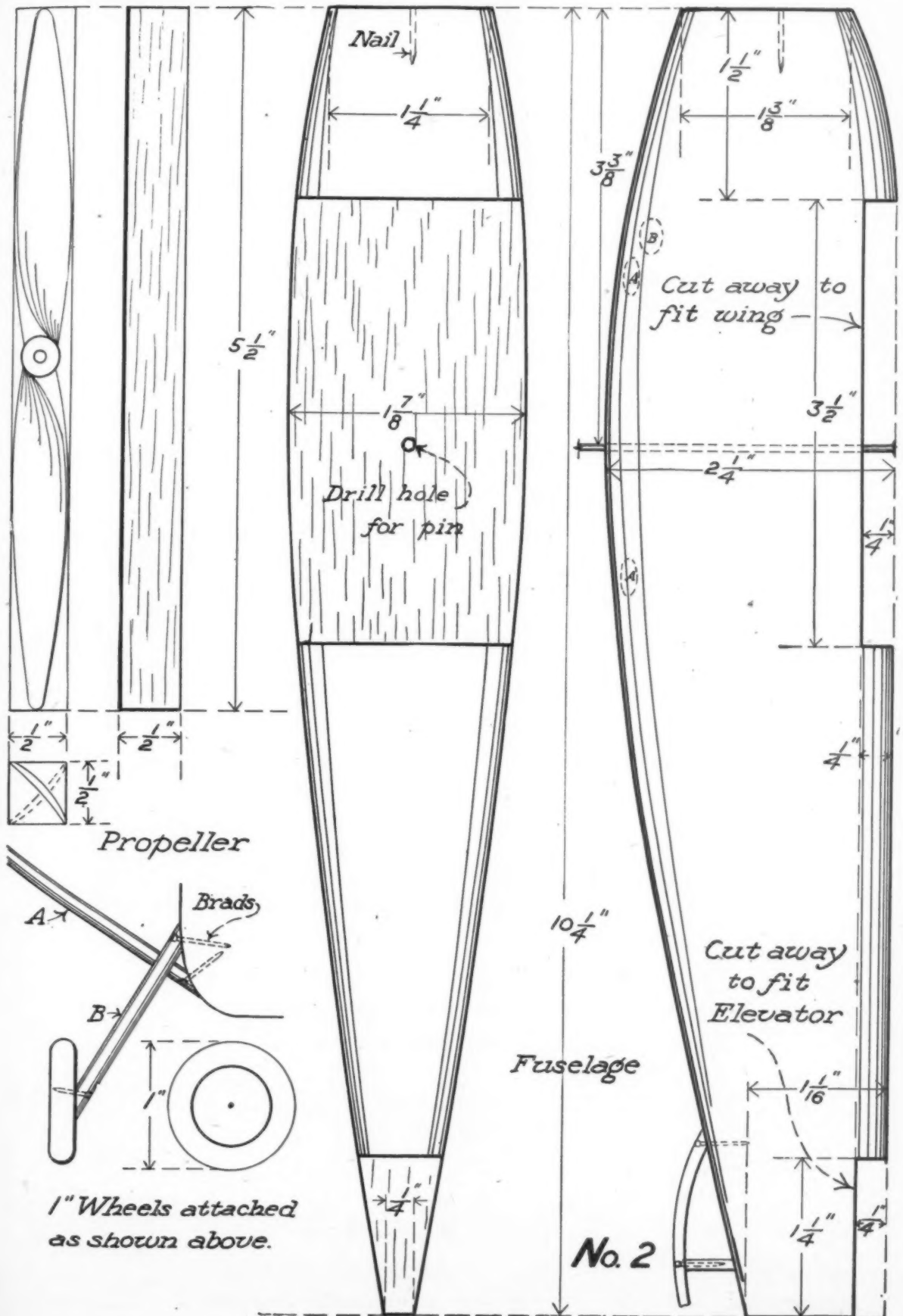
The best tool for shaping fuselage is the draw knife with the block held securely in a vise.

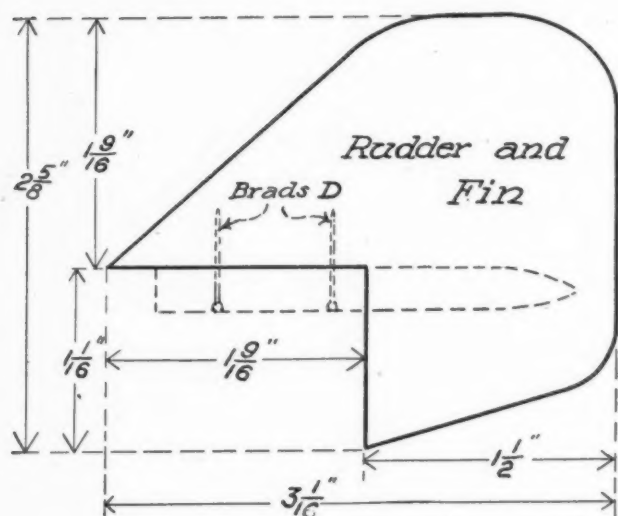
(See Plans on pages 40 to 42)

No. 1

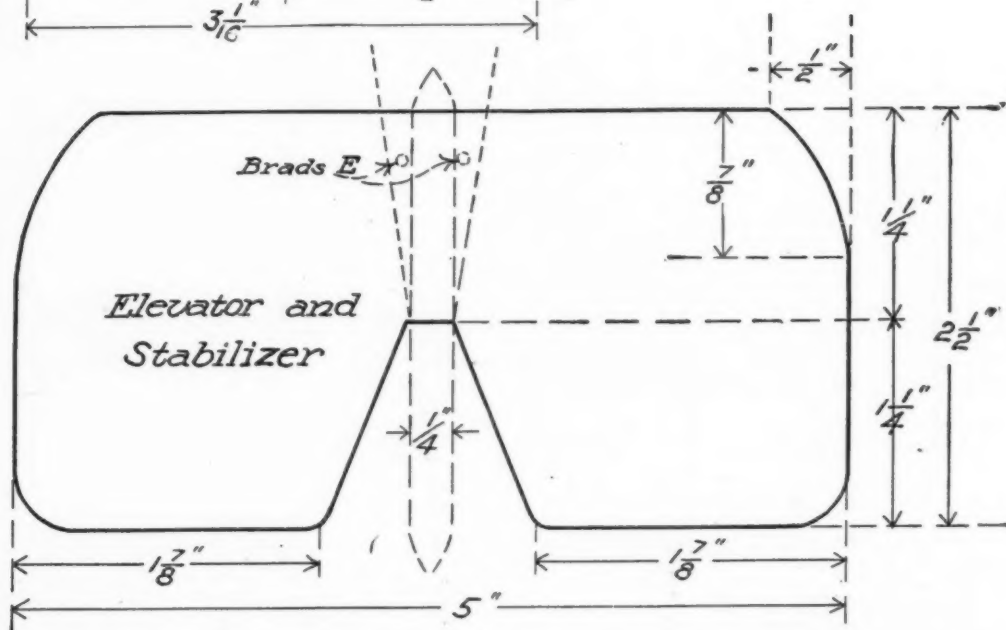
AIRPLANE WEATHER VANE



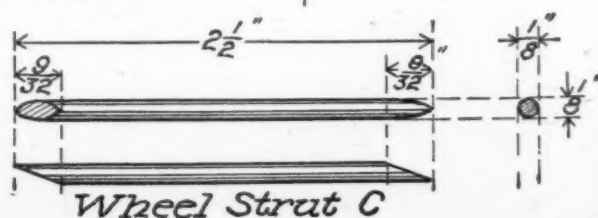
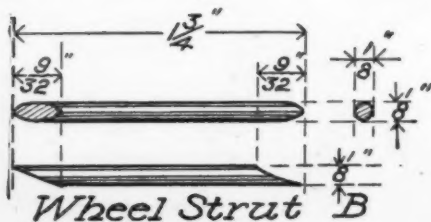
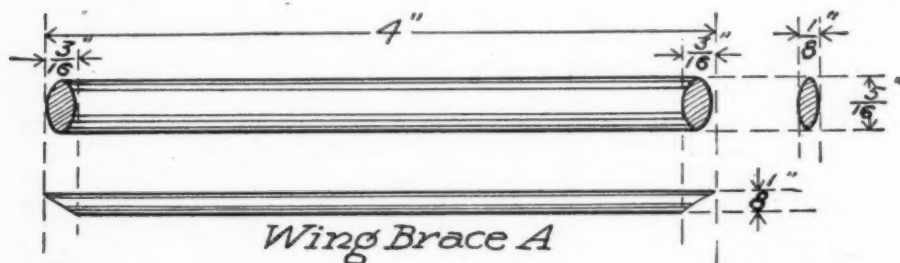




No. 3



*Elevator is first tacked to Rudder with brads D
Then to Fuselage with brads E at points shown*



ALL Balsa—AMERICA'S MOST EASILY CONSTRUCTED MODELS!

A new, all-balsa construction makes these Midland models superior to anything you have ever seen. Lighter—about two-thirds the weight of an ordinary model of the same size. Stronger—practically crash-proof. Better-looking and more realistic—smooth, sheet-balsa surfaces instead of wrinkled tissue sagging between ribs and longerons. Easier to build, because so much simpler. A job you can do in a couple of hours instead of a week. And you can do it. We've eliminated the question of skill.

Midland's all-balsa construction makes use of sheet balsa 1/32 of an inch thick for the wings and the sides of the fuselage. Balsa—almost

as light as the paper it replaces, and infinitely stronger! The only paper is that used to cover the top and bottom of the fuselage and the tail.

No fragile, tedious, built-up framework. Nothing to draw. Nothing to measure off. No nails to drive, no holes to drill. A ready-made, die-stamped aluminum propeller to save you the work of carving one and to prevent the failures due to poorly-made propellers. Struts of spruce and bamboo. Celluloid wheels, light and good-looking. A shock-absorbing landing gear. Colorless, quick-drying model cement—the fastest-drying known. Rubber 10% more powerful. Landing wheels well forward to protect the pro-

peller. Wings at a high angle of incidence for fast climb and minimum center of pressure travel. Tips "washed out" to reduce losses. Scores of other aerodynamic refinements seldom found in models.

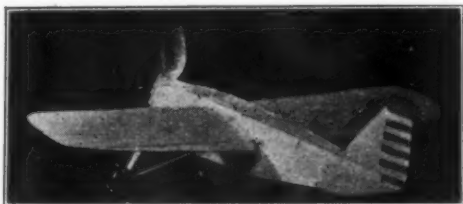
You will find these models much easier to build, and, after you have built them, much more satisfactory to fly. Fewer trial adjustments; longer, steadier flights.

The MIDLAND MODEL WORKS
Box W, Chillicothe, Ohio

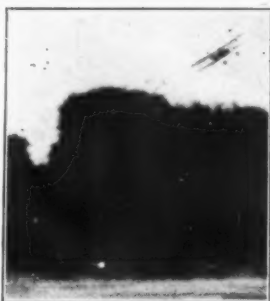
TAPER-WING COMBAT MONOPLANE— An Unusual Value

An exceptionally graceful model of a center-wing combat monoplane, and the best distance flyer of the Midland group. Does 200 feet consistently. Can be hand launched or will rise off ground. Very easily built, and will stand hard use. Wing span 20 inches. Weight 8/10 ounce.

Complete set, with all material and full building and flying directions, postpaid in the United States and Canada. **\$2.00**



Midland Army Biplane in Flight



Retouched photograph

THINK BEFORE YOU BUY

Not all model airplanes have given their purchasers the pleasure they expected. Some disappointments have been due to unreasonable difficulties encountered in construction; some have been due to the fact that the models were actually incapable of flight even if properly built, and still others have been caused by dishonest pictures and descriptions of the models.

While it is regrettable that not all model aircraft manufacturers are entirely honest, it is fortunate that you yourself can see through the more usual tricks. Don't be fooled by flight claims that are obviously impossible. Remember that a guarantee is no better than the company behind it, and that a testimonial that has been secured through the offer of prizes or "merit certificates" is not to be trusted.

Be especially cautious about "doctored" photographs—photographers retouched to make the model look better than it really is. Remember that any cloth—or tissue-covered model with a round fuselage (like the Lockheeds) will have an angular, ribby appearance, no matter how smooth and shiny it may look in the illustration. Some manufacturers have advertised their models with retouched photographs of full-size planes. One firm, for example, advertises a model autogyro with a drawing of a man-carrying machine. This same company sells a biplane with a picture taken from the advertisement of another model. And the stolen picture has been retouched to look better than the original!

A little care in watching for just such practices as these will save you from the disappointment experienced by many model aircraft builders.



MIDLAND BABY BULLET

Wing span 15 inches. Weight 3/8 ounce. Flight range 140 feet or more.

A simple, easily-constructed r. o. g. model of a one-place low-wing sport plane. The propeller is only one-fourth as long as the wings, and much closer to true scale than in ordinary models. Propeller blades deeply curved for slow revolution and unusual duration.

Complete set, with all material and full building and flying directions, postpaid in the United States and Canada, only **\$1.00**

REALISTIC ARMY BIPLANE

This fast biplane fighter is a tremendously impressive model. Its trim fuselage and tapered, close-set wings give an impression of speed, and in the air it looks so much like a real ship that flight photographs of the model are usually mistaken for pictures of a full-sized airplane.

The wing spread is 20 inches, the weight exactly 1 ounce. The flight distance is close to 200 feet. Because of its greater wing area the Army Biplane gains a great deal of altitude. The average limit is about 50 feet, but we have photographed it when almost three times that high!

The top wing is in advance of the lower one, and at a larger angle of incidence. This results in the center of pressure of both wings being shifted forward when the model dives, back when it climbs. This is the exact opposite of the usual movement, and gives the model unequalled stability. By far the best rough-weather flyer we have seen.

Harder to build than the monoplanes, but still much easier than any conventional built-up model. Complete set, with all material and full building and flying directions, postpaid in the United States and Canada . . . **\$2.50**



ORDER NOW—USE THIS COUPON

The MIDLAND MODEL WORKS, Box W, CHILLICOTHE, OHIO

Gentlemen:

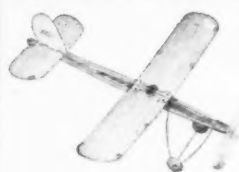
Enclosed find \$..... for which send me your construction set for () BABY BULLET () COMBAT MONOPLANE () ARMY BIPLANE. I understand that these sets will be sent postpaid in the United States and Canada, and that you will refund the purchase price of any model which fails to satisfy me after I have constructed it.

(Check or money order safer than cash. We cannot accept stamps or fill C O D's. No catalogue, except with set.)

Name

Street

City State



Model
No. 1
\$1.00

OUTFLEW ALL OTHERS

Regardless of Price!

Boys! Here are the planes that really fly!—and not just once or sometimes but repeatedly. In 193 recent tests out of 200, Kingsbury Silver Arrow Flying Planes outflow all other makes, regardless of price. Since July 1st, 1929 Silver Arrows have flown more than 200,000 miles. Put a Silver Arrow in competition with boys who have other planes and you will consistently win the contest. Here are experts' planes—proved successes. Launch by hand or take off from ground. Zoom 'way over housetops on long, continuous flights. Not construction toys but fully built. A moment to assemble and they're ready to fly. Made of Balsa wood and aluminum; aluminum propeller; powerful elastic motor; wings adjustable to insure flying under all conditions, and to help resist smash-ups.

FIVE MODELS

Racing Types—No. 1, wing spread 18 in., \$1.00; No. 2, wing spread 26 in., \$2.00; No. 3, (dual rudder) wing spread 33 in., \$3.00.

Cabin Types—No. 21, wing spread 22 in., \$2.50; No. 22, wing spread 26 in., \$3.50. (West of Miss., \$1.10, \$2.20, \$2.75, \$3.50, \$3.85). If your dealer cannot supply you, send your order to us

JOIN the SILVER ARROW FLYING CLUB and BECOME A MASTER PILOT

Write for information.

FREE! Moviescope and Toy Catalog



Send for this free Kingsbury Moviescope. Twirling the leaves of this novelty book reveals a motion picture of a Silver Arrow in flight. Also illustrates and describes 50 interesting Kingsbury Motor Driven Toys.

Novelty Eraser Only 10c

Send 10c (coin) for this Kingsbury Non-Skid Eraser. It's a red-enamelled 2" steel disc wheel with a big "balloon" tire of solid eraser rubber. Set of 4, 35c.



KINGSBURY MFG. CO.
108-H Myrtle Ave., Keene, N.H.
KINGSBURY
MOTOR DRIVEN TOYS

How to Build a Smoke Screen Model Plane

(Continued from page 27)

The wheels are made of wooden curtain rings with button molds turned down to snap inside. A little ambroid will hold the two pieces together. The wheel bearings are 1/8" brass tubing 1/2" long and are bushed in place with rubber tubing as illustrated.

Iron washers are then ambroided to the inside of each wheel to give them the necessary weight and to resemble brake drums. Each wheel should weigh not less than 3/4 ounce. Heavy wheels will lower the center of gravity of the plane and thus make it stable.

A simple shock absorber is made by using a V-shaped strip of celluloid and a piece of 3/16" flat rubber. Do not link them together until after the ambroid has thoroughly set. Note drawing of landing gear.

The main bearing for the propeller is made of a piece of 1/8" brass tubing 1 1/4" long with a brass washer soldered near one end to form a flange. See drawing.

Note—Before ambroiding this bearing in place, be sure that it is in perfect line by sighting through it to the tailpost anchor. This is important if good performance is expected.

The propeller shaft is a 4 1/2" piece of number twenty-four piano wire formed and soldered to the propeller as illustrated. Small brass strips on each side of the propeller where the shaft goes through prevent the shaft from pulling out and also prevent the bearing from wearing into the propeller.

The propeller is made from a 10 x 1 1/2 x 5/8 inch block of hard balsa. Use the templet shown to obtain the outline of the propeller on the block. Then cut out the form with a jig saw. The propeller blank is now ready to carve. Cut from the center to the tip and carve the side that will go next to the fuselage first. This side should be slightly concave.

After this is complete, shape the other side to form the section shown and finish with fine sandpaper. Be sure the propeller balances perfectly so that there will be no vibration.

The propeller should be given three coats of straight dope to strengthen it and can be easily balanced by simply adding a coat or two to the light side. Much of the success of a model depends on the efficiency of the propeller. Take time to see that you make the propeller right. The illustrations will help.

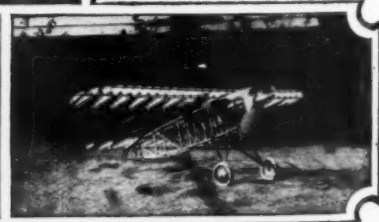
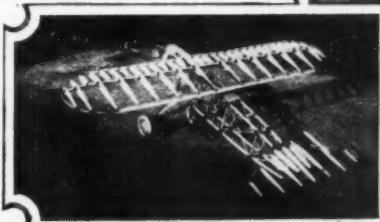
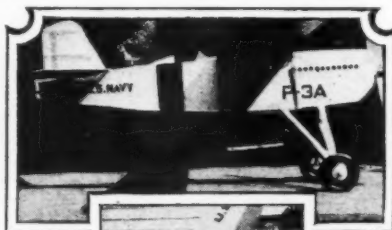
The spinner is ambroided on after the propeller has been attached to the shaft and is in place on the nose-block.

NEXT, make the wing by using light balsa for the ribs and spar and medium balsa for the entering and trailing edges. A profile should be laid out on a flat board first as when making the fuselage, and the parts held in place with brads or pins where necessary. Be sure to keep the wing as light as possible. This will make the model stable. No dihedral angle need be given the wing as there will be enough formed when the paper covering becomes tight. Also see that a slight amount of incidence is warped into the left tip when the wing is covered.

Bamboo strips are used to form the tips and number eighteen piano wire is used to make the wing supports.

These are ambroided to the thick center ribs. The wire supports should be covered with rubber tubing where they come in contact with the fuselage. This prevents the wing from slipping out of adjustment.

Mino silk tissue is used to cover the plane. Apply LePage's glue sparingly to the frame with a small brush. Put glue only on the central ribs, entering and trailing edges when covering the wing, and not on all the intermediate ribs. The fuselage should be



Some more views of the model showing, (top) a side view, (next) another view of the smoke screen device, and then two views of the model in construction

covered in a similar manner, except that glue may be used on all the struts as well as the longerons.

Use only high grade dope cut 1/2 with a high grade thinner. Apply four coats with a soft brush, allowing each coat to dry thoroughly before the next one is applied. This will give the paper a drum-like tightness.

The plane may be painted with a high grade lacquer applied with a spray gun. The lacquer should be cut 1/2 with the dope used to tighten the paper. The original model was decorated similar to the regular navy fighters.

The wing and elevators are orange, while the fuselage and rudder are aluminum. Red, white and blue stripes are put on the rear half of the rudder and a red band painted around the fuselage just to the rear of the cockpit. The spinner is red, the propeller is aluminum and the wheels are black with aluminum hubs. The star insignias are put on with a spray gun and stencil. They consist of a red dot in a white star with a round background of blue.

A small celluloid windshield and soft balsa headrest add greatly to the appearance of the finished model. These can be ambroided on after the model is painted.

THE plane is now complete and is ready to have the smoke screen device attached to it. This consists of a 3 1/2" piece of aluminum tubing with a 3/16" inside diameter attached to a thin strip of balsa by a set of number eighteen piano wire clips. The simple construction is shown in the drawing and photograph. Two small holes are drilled in the front end of the aluminum tubing to receive the bent ends of the wire clip, while the rear end of the tubing merely snaps into the clip. The whole device is held in place on the fuselage by the same rubber bands which tie the wing in place.

Cartridges used to refill the device and which create the smoke are easily made by packing an ordinary soda straw with the following mixture:

- 2 parts Potassium Nitrate
- 2 parts Sulphur
- 1 part Powdered Charcoal

The above should be thoroughly mixed and kept dry. Any of these chemicals can be obtained at a drug store.

Important—Pack, do not just fill, the soda straw with the mixture or else it will only burn without much smoke, due to the fact that too much oxygen reaches it. The proper way to do it is to pinch one end of a 3 1/2" piece of straw and put a little of the mixture in at a time, packing it down tightly with a small rod made for the purpose. The cartridge is slipped in the aluminum tubing, leaving just enough showing at the rear to allow it to be ignited with a match.

It will burn for a second or two



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at first and then start throwing out a dense bluish white smoke with no flame outside of the aluminum fire shield. The effect is quite spectacular. One cartridge smokes for about the entire flight of the plane.

Experience will teach one the true settings for the wing, elevator, and rudder to obtain the best flights, and no attempt should be made to fly the model with the smoke screen working until it is properly adjusted as a crash might set the model on fire.

A hand drill fitted with a hook instead of the drill is convenient to

wind the rubber motor. The ten-strand motor may be given 100 turns with a 4 to 1 winder and the 14-strand motor may be given 80 turns.

A solution of glycerin and castile soap will preserve the rubber and allow a free action. Apply a small amount to the rubber after every twenty or thirty flights. Castor oil makes a fine lubricant for the main bearing.

Treat your little ship with the same respect that you would have for a real plane and it will repay you with fine performance.

Wings of Valor

(Continued from page 26)

weapon spit a venomous message of smoke and flame. Despite the singing of the wind in his ears, he could distinguish the whirling howl of the bullet as it plunged past him to the earth.

SCARFACE brought the ship as close as he dared to the dropping chute. Jimmy muttered a silent prayer and, unable to help himself, gave himself over to a higher power. Scarface desperately gave the Curtiss the gun and whizzed past the parachute, banking neatly, and passing completely around it. Blackbeard brought his weapon into play again and fired three rapid streaks toward the bobbing chute.

Jimmy's tensed muscles relaxed as the Curtiss whizzed past, and he suffered no wound. He glanced down toward the ground. A mob of humanity milled around the field—mechanics and pilots alike, wondering what this strange cloud hunt predicted.

Jimmy estimated that the distance to the field was now no greater than a hundred feet. He looked upward again and noticed that the plane of Scarface and Blackbeard was zooming up and heading for the blue-gray mountain peaks in the distance. Silently he offered up thanks to heaven for his life and prepared to land.

His feet touched the earth lightly, then the chute, still filled with air dragged him to the earth. He sprawled clumsily in the grass and lay still. He gazed dazedly at the sleeve of his flying tunic, and was rather amazed to see it stained with blood.

A moment later half a dozen hands dragged him to his feet. He recognized the familiar features of the super before him. The latter shook him by the shoulder tenderly.

"What is it, boy?" he asked. "Quick. We'll give chase."

With a tremendous effort Jimmy summoned all his reserve strength, and told a swift coherent story of his adventures since the night he had left the field in the Sikorsky. When he had finished his narrative the super turned to his men.

"Quick," he barked. "Every avail-

able plane on the field. Hennessy, you take the armored ship—the one with the machine gun. I'll assign a man to go with you."

"I'll go with him," said Jimmy quietly.

"You can't," said the super looking at his arm. "You're wounded."

"That's nothing," said Jimmy. "Just a scratch. I've got to go. Suppose they lose sight of the Curtiss. No one can find that hideout but me."

The super gazed at him for a moment doubtfully.

"Well," he said at last. "Go ahead. I guess you've earned the right to be in at the kill."

Jimmy waited no longer, but, with his wounded arm dangling helplessly at his side, raced across the field to Hennessy's plane which was warming up on the tarmac. Hennessy looked at him inquiringly. Jimmy nodded to him authoritatively and took up his position at the Lewis gun which was mounted in the cockpit.

A moment later six planes of the United States Mail Service zoomed gallantly over the elms at the far end of the field and took up the journey of vengeance. Far over to the West flew the Curtiss, a mere speck in the center of the sun. The six ships flew steadily along in battle formation; Hennessy's ship at the center of the flying wedge which they formed.

JIMMY sat bolt upright in his seat, impervious to the pain of his aching left arm. His eyes were glued to the ship ahead, and his right hand was curled about the trigger guard of the Lewis gun. For the third time, he was in hot pursuit of the fleeing Curtiss, but this time the odds were in his favor.

Closer and closer the roaring half dozen winged Nemeses flew. Jimmy, glancing down at the earth below, suddenly realized that they had almost reached the mountain lair of the flying crooks. The Curtiss was now barely more than a hundred yards ahead of them. From where he sat Jimmy could see the fear-dazed eyes of Blackbeard as he looked out over the rudder at the approaching cavalcade behind him.

Jimmy's finger tensed on the trig-

ger, but before he could unleash the leaden death that his weapon held, Blackbeard rose to his feet and flinging up his hands, nodded toward the earth. Hennessy yelled into his ear. "Don't fire, youngster. They're surrendering."

Jimmy nodded, as he watched the plane ahead dive down toward the earth. Hennessy and the wedge shaped formation followed rapidly.

Six planes landed as one in the wake of the Curtiss fugitive. Jimmy sprang from the armed ship, as the rest of the aerial fleet unloaded their troops. Blackbeard and Scarface stood with hands raised above their heads, as half a dozen pilots, with drawn guns bore down on them.

"Come on," called Jimmy to Hennessy. "Let's see if Dad's all right."

Together they raced toward the wooden shack, the roof of which could be seen through the screen of pine trees. Jimmy reached the door first. Joe, aroused by the noise of the landing, met him on the threshold. Jimmy swung his right hand to the other's jaw. The gangster reeled and fell, and Hennessy leaped upon him.

Jimmy rushed to the bunk in the corner. Slashing hastily with his knife he severed his father's bonds for the second time. His father looked up at him with a pale and drawn face.

"I knew you'd do it, son," he said.

Jimmy smiled down at him.

"Hurt, Dad?" he asked.

His father rose to his feet.

"A little weak, that's all."

His eyes fell upon the blood on Jimmy's sleeve.

"You're hurt yourself, son."

Jimmy was aware of a terrific throbbing in his arm, his whole body seemed to ache with an incomprehensible pain.

"That's nothing, Dad. Nothing but a scratch."

He was alarmed at the sound of his own voice. It seemed hollow and as if it came from a great distance.

Through some distant void he heard his father's next words.

"He's going to faint, Hennessy. Give me a hand."

Jimmy fought desperately against the weakness that he suddenly felt upon him. He felt his knees buckle under him. Abruptly a sea of blackness flooded his brain. His father and Hennessy gazed at him for a silent moment as they steadied him. "You've got a great kid there," said Hennessy.

His father was silent, but a single tear streamed unashamed down his lean brown cheek.

THE END.

Lack of space prevents our publishing further instalments of the Dictionary of Aviation at this time.

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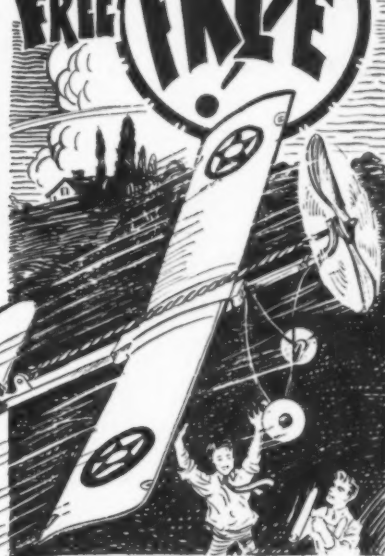


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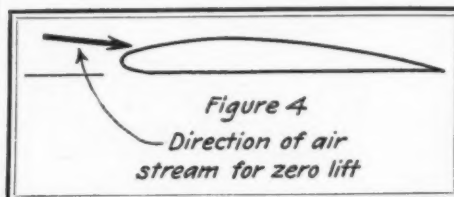


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A Course in Airplane Designing

(Continued from page 34)



created as they move through the air. That is a characteristic of an efficient airplane. It must pass through the air without leaving a very marked wake of disturbed air behind it because a ship that does disturb the air loses its power doing so, while the power spent in stirring up the air could be used to better advantage for other purposes, such as greater speed of the craft.

DOWNWASH

Another important matter connected with the air flow around a wing is that of downwash. With the entire lower surface of the wing pushing the air downward, and with the upper surface pulling the air downward, it is evident that the air stream as it leaves the wing will be deflected from its original direction. This is shown in Figure 2. Downwash presents an explanation for many of the apparently reasonless actions of models. For instance, I once flew a high wing monoplane model that refused to fly well unless the wing were placed at least *three inches* behind the center of gravity. Then the model flew fairly well. What caused it? Simply this: the wing, being above the fuselage, deflected the air down upon the tail surfaces and caused the ship to stall. Then when the wing was placed far behind the center of gravity, the weight exerted a force that counteracted the downwash and the model flew. The downwash from the wings of the average model airplane, however, is very seldom as pronounced as it was in the case mentioned above, and very often becomes more of a help than a hindrance. For example, if we balance a ship so that it will climb fairly rapidly with the power on, while the effect of the downwash is greatest, the ship will nose down slightly when the motor stops, because the downwash is no longer exerting as much pressure on the tail surfaces as it did with full power and speed.

SLIPSTREAM

The propeller of an airplane produces thrust by moving the air out of its place, just as a wing produces lift. In fact, a propeller is nothing more than two or more wings rotating about a shaft. The air that these

two or more wings push out of its place is thrown off behind the propeller in the form of a whirling wake, which flows around the ship as it is pushed backward. The diagram, Figure 3, shows the slipstream flow in greatly simplified form. The air really eddies about the parts of the ship and spreads out

as it goes back, but the diagram is drawn to show how the stream affects the tail surfaces. We can see that the rotating slipstream strikes the stabilizer, the elevators and the vertical surfaces, tending to twist the ship. As it strikes the vertical fin and the rudder it turns the ship, and as it strikes the horizontal surfaces it banks the ship. The banking effect is increased by the torque of the propeller, which is the drag of its blades as they rotate. The turning and banking forces are usually overcome by applying a little rudder in the opposite direction, or by setting the vertical fin slightly out of line.

ANGLE OF ZERO LIFT

Contrary to general belief, an airplane wing will produce lift even when it is set at a negative angle of attack. While the pressure on the lower surface of the wing has vanished, the partial vacuum on the upper surface is still existent and accounts for the remaining lift. There is, however, a certain negative angle of attack for every wing section at which the lift does actually become zero. For this reason, it is often convenient to express the angle of attack as the angle between the direction of motion of the wing and the setting where the lift would be zero. This is called the *absolute angle of attack*. It might be well to state here that the usual angle of attack is measured between the direction of motion and the chord line, making the angle of attack always less than the *absolute angle of attack*.

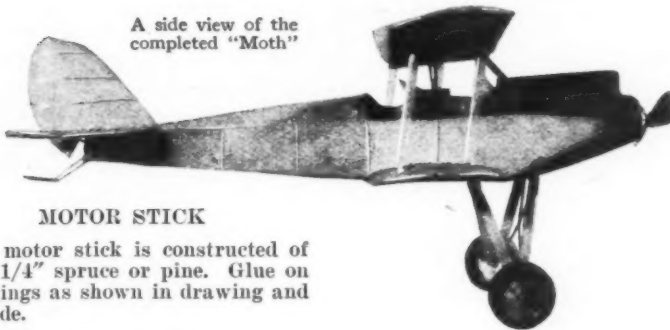
QUESTIONNAIRE

1. What is the cause of wing tip vortices?
2. Why does a low aspect ratio wing have a lower efficiency than a high aspect ratio wing? (A low aspect ratio means a large chord and a small span, as contrasted to a large span and a small chord for a high aspect ratio).
3. Why are the German sail planes efficient?
4. What is the cause of downwash? What effect does it have upon the tail surfaces?
5. What is the absolute angle of attack?

How to Build a D. H. "Moth" Biplane

(Continued from page 7)

A side view of the completed "Moth"



MOTOR STICK

The motor stick is constructed of 1/8" x 1/4" spruce or pine. Glue on all fittings as shown in drawing and set aside.

PROPELLER

This is carved to shape from a block of white pine or spruce as shown in drawing. This propeller is a low pitch, high speed one. Make sure to carve carefully and balance it perfectly. Insert the shaft and lay aside to dry.

FINAL ASSEMBLY

Note that there are two walls of 1/16" balsa glued to the side of the fuselage. These serve as a base for the setting of the wings. However, before this is done, the landing chassis must be constructed. Make this according to the plans, using pins for reinforcement and plenty of glue.

Incidentally, the glue is colorless and will help to make a neat job. Allow at least two hours for the landing gear to dry. Now glue to the fuselage the balsa wing bases as shown.

COVERING

The wings are covered with Japanese tissue. Banana oil is used for pasting, making sure to use a soft brush for applying this. Pull the tissue covering very tightly to remove wrinkles. Cover all four wings and center section. The fuselage is also covered in the same fashion.

To obtain the model's center of gravity and best gliding angle, one must find the balancing point of the fuselage. The tail surface must be

glued tightly in position, also the motor stick and propeller. When the balancing point has been found, work it back and forth and set the wing one-third forward of it.

Attach lower wing as shown in drawing. Give the correct amount of dihedral and incidence angles as specified, allowing plenty of time to harden. In the meantime, glue the two upper half wings to the center section. Insert the center section struts. Glue the upper wing in position. Cut the wing struts of balsa to size, streamline and glue in position.

FLYING

Now that all is in readiness, try gliding the model. Hold it firmly, nose it down slightly and let go gently. It will make a neat three-point landing. If it stalls, the wings should be set back slightly. If this change is not needed, weight can be added to the nose by wrapping rubber bands around it. Should the plane dive, set the wings slightly forward.

Take the plane out in the open if possible. Wind the motor at least twenty-five to fifty times for a trial hop.

Then wind it up full, hold the tail slightly off the ground, push gently as the propeller is released and watch it go.

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20 sheets	1/16"x2"x12"	.50
25 sticks	1/4"x1 1/4"x36"	1.10
25 sticks	1/8"x1 1/4"x36"	1.00
12 sticks	1/8"x1 1/4"x36"	.50
25 sticks	1/8"x1 1/8"x36"	.60
25 sticks	1/8"x1 1/8"x20"	.45
50 sticks	1/16"x1 1/16"x20"	.50

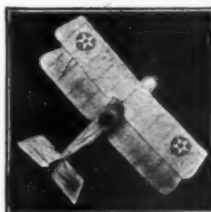
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(Continued from page 23)

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SW. 225°	229°	-4
W. 270°	273°	-3
NW. 315°	315°	0

FIG. 5

the compass course in 1930.

2. The magnetic bearing from A to B is 225°, variation in 1918 12° 10' E., increasing 11' annually. Calculate True Course.

3. The Compass Course from A to B is 38°, variation 18° 15' W. Deviation 5° E. What is the True Course?

4. (a) What is Compass Error?
(b) When would you convert true bearing to magnetic bearing and vice versa?

5. Calculate from Figure 5 the amount of deviation you would allow on a course of 108°.

Prisoner of the Air

(Continued from page 6)

it as it had the opposite side of the river and the surrounding hills. Unmistakably this mysterious clearing was a pocket-size landing field! He peered down through his goggles to be sure. By any chance could the rebel bandits hope to possess a plane? Was there some other alien force at work here?

Signalling Capper to hold all fire, he lost altitude rapidly, dropping down to fifteen hundred feet. Even this elevation was dangerous, he knew, for the bandits were excellent marksmen. The clearing looked deserted. The green wall of jungle on either side offered no solution of the mystery. Blimp peered downward till he felt that his eyes would pop from the strain.

He circled, losing about four hundred feet. Should he take a chance and land? He felt sure he could make it all right, despite the size of the clearing, and the fact that he would have to come in cross-wind. The idea appealed to him immensely, even though it would make him a prime candidate for the Suicides' Club.

Sober judgment argued Blimp out of it. It was unsafe for two American flyers to come down alone anywhere in Nicaragua where the American flag wasn't flown. He had no right to satisfy his curiosity at the risk of losing some valuable information for the squadron. If he were killed they'd never know about this hidden clearing. Capper couldn't handle the Corsair in this tight little valley. He decided to use his head and go back for another plane or two to help him ferret out the reason for this jungle mystery.

As he banked for a turn, he caught a glimpse of something moving in the furthest edge of the field. He hadn't been entirely wrong! He was going back to San Ramon with some real information. He side-slipped until he was down to nine hundred—

seven hundred—feet. Lower than this he dared not go.

As the trees on the mountainside, much closer to him than the field, whizzed past, Blimp had, for one instant, the sickening recurrence of his nightmare. Great Scott! He couldn't let anything get him now.

He headed straight for the point across the field where he had seen the flash of movement. The proximity of the mountain sent echoes of his motor flying back to him in a mighty roar that sounded like a squadron diving.

JUST as he came to the end of the field, with his eyes glued downward, he felt a thud in the wooden frame-work below him. They were drawing fire! A few seconds later he noticed a hole gaping through the fabric of his right wing. Somebody down below was an uncomfortably good shot. Blimp opened the throttle wide and pulled her nose up. No sense in letting them make a sieve out of his Corsair. He was rather fond of the old boat.

Up to fifteen hundred feet Blimp climbed. Once again he was tempted. He would circle once more and get all available data on the dusky gentlemen below. They were undoubtedly the rats to whom Captain Allby had referred. It wouldn't hurt to take one more chance, particularly as his motor was turning over as sweetly as ever, and it would save time later on.

This time the hidden enemies were not so patient. Blimp saw puffs of smoke emerging from the jungle long before he had reached the edge of the field. He braced himself for a dive that would carry him over the enemies' position and well on out of the canyon. This time Sergeant Capper returned the fire—but it was impossible to hit anything through that screen of foliage.

As he went went over them, Blimp

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MACFADDEN BOOK COMPANY, INC.
Desk M. N. 8, Macfadden Bldg., 1926 Broadway, New York, N. Y.

caught a glimpse of three or four men grouped about a machine gun at the foot of a big banana palm. A machine gun! That meant a fairly large encampment back in the jungle. Sandino did not disburse precious machine guns to inferior forces.

He had pulled up out of the dive and was congratulating himself on a good getaway when he saw that his oil pressure was dropping. The little needle spun round madly. His oil temperature was working with equal rapidity in the opposite direction. They had hit his oil feed line!

Blimp felt a wave of cold terror ascend his spine. He could never make his way out of the canyon now, let alone the distance from Requita to San Ramon. As far as he knew, there wasn't another landing field between him and San Ramon except this devil's pocket kerchief policed by the enemy.

There wasn't much choice—either to crash in the creek bed or go back and trust Capper and himself to the tender mercies of Sandino's henchmen. Already the motor was beginning to groan. He could feel her laboring.

Blimp looked over the edge of the cockpit. Far below him the river was entering the canyon again. Even from his height, Blimp could see the foam as it churned through the narrowed channel. The treacherous hills on each side were clothed with green vines but Blimp knew that, underneath them, the jaws of the canyon were waiting for them. He turned a little sick.

Better to go back and face it out with the bandits. Capper and he had the machine gun and the revolvers in their belts. At the worst they might die fighting. He cut the switch, kicked rudder and pulled her around. There was nothing for it now but to glide down to the field and give as well as they were sure to take.

To his relief, Blimp didn't experience any return of what he called his "crash hangover". Possibly because he was thinking of the warm reception they would receive on landing. The field was small even with a gun to balloon in with. If he came down short he knew there wouldn't be much need of meeting them with anything but a shutter. The jungle creek passed under him like a blue streak as he placed his plane in a vertical nose-high slip. Leveling off, and after a violent fish-tail, he felt his tail skag touch the rocky field.

Immediately it seemed that the jungle came alive. Small dark men emerged from every direction, Springfield, old Mausers, even machetes in their hands. They didn't seem to give a peso whether the plane hit them or not. By the time the Corsair had reached a full stop, Capper had the machine gun in action. They were returning his fire at a lively rate. The battle was on.

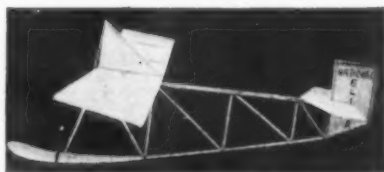
BOYS!

Here's Good News

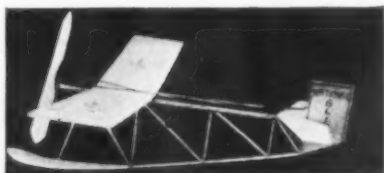
Giders you sure will want

THE NEWEST THING IN MODEL BUILDING

The rapid growing, nation-wide interest in Gliders makes every Boy keen to build a model and glide it. Here are two—perfect in design, easy to build from the Complete Construction Sets with full size drawings and instructions we have made ready for you. They perform wonderfully well. Raised at arms height—they take off gracefully to a long soaring glide, a wavy glide, to soar again as the air currents command.



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This second illustration pictures the Powered primary Type Glider. The added features of propeller and power make this model a real flyer as well as glider. On recent tests has flown 15-20 seconds and exhibited excellent soaring ability as well. Same dimensions as primary Glider and parts furnished in color. Set Complete .75.

The two models when ordered together sold for \$1.00. Send for yours today.



The latest response received from model builders to the Lockhead Sirius which we presented last month and the compliments from those who have built the model prompt us to again call attention to this most beautiful and complete model plane which has demonstrated remarkable flying ability. The illustrations show the model as built from National construction set and the complete set as it will reach you, ready to build. Price \$2.00.

Add to price of all sets 25c for packing, postage and insurance.

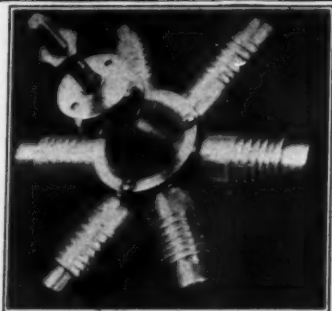


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Blimp had loosened his safety belt. As soon as he could let go the controls, he dropped to his knees at the bottom of the cockpit. He could give Capper a little help in holding off the reception committee. He raised himself slightly and aimed at the nearest oncoming bandit. The man dropped like a plummet.

Capper's fire was murderous, but unfortunately he had to expose himself more than Blimp. Already he had a nasty slash across his forehead. Perceiving that he was easier to hit than Blimp, the natives began concentrating their fire on him. Blimp put two eager bandits with this idea in mind permanently out of business. But try as he might, he could not adequately cover Capper against the numbers that were after him. The sergeant, game to the very last, gave a sort of cough and slumped down in his cockpit. Shouts and cries of joy went up from his assailants.

With cold fury Blimp waited, knowing that every shot must count. Bullets whistled over his head and through the rigging of the plane, but they did no serious damage. It

seemed, almost, as if the Nicaraguans were deliberately missing him, for, contrary to general public belief, they are good shots. Months of combat against the marines have taught them the value of a sure aim. They were trying to keep Blimp in the bottom of the cockpit until they could close in on him.

Before they reached the plane, Blimp was able to fire three more shots but his fire was no longer accurate. He was forced to fire in a hurry and almost without aim. He was raising himself over the edge for another try when the world went black and he sank to the floor of the cockpit. Before he went completely out, Blimp dimly heard a cry of victory in a language which he knew was not Spanish.

Those who love a good fight against odds, full of fast and furious action, would do well to make note to get the next issue, in which is the concluding installment of Blimp's rousing adventures with Sandino's bandits. And what surprises there are in store for everyone! Don't miss your copy. On all news stands August 23rd. Price 15 cents.

Gliding and Soaring

(Continued from page 19)

immediately, and act upon his decision, or they will be gone.

Concentration. A pilot must possess the power to concentrate. This is necessary both while he is learning to glide, and after he has become an able soarer. During his first flights, he must be able to focus his attention exclusively upon the moves which he must make in order to guide his ship. When the use of the controls has become instinctive to him, he must be alert to every floating leaf, every flying creature, every contour of the earth, which may indicate a useful current of air. Care should be taken, however, that this concentration does not develop into overconcentration, or nervous tenseness. The pilot who worries about imagined dangers cannot be aware of the problems immediately at hand.

Courage and Confidence. The courageous pilot is not the one who feels no qualms, but is the one who is able to comport himself with coolness no matter how terrified he may be. Courage is necessary in gliding, only because the idea of leaving the earth entirely and rising into the air is still a novel one. After a few flights, the pilot discovers how free from danger gliding actually is.

Confidence in the plane, and in one's ability to handle it, is a companion qualification to courage. Yet, overconfidence should be avoided, since it lessens the pilot's good judgment, and encourages him to act carelessly.

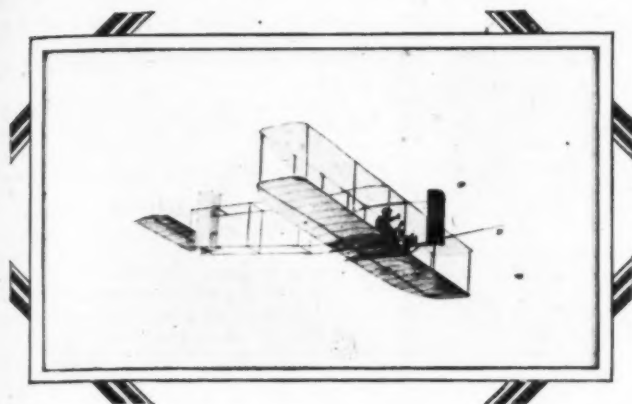
Motored Plane Pilots as Glider Pilots. Motored plane pilots have not, in general, found that they have much advantage at first over complete novices. It is difficult for them to accustom themselves to the low speed of the glider, to its sluggish response to control movements, and to its inability to climb. On the other hand, some power plane pilots, who understood the principles of soaring flights, have made considerable progress in gliding from the outset. Lindbergh stayed up almost a half hour on his first glide.

License Requirements. The National Glider Association, Inc., prepared the rules for obtaining glider licenses. These rules were later approved by the National Aeronautic Association. Licenses are granted purely for the demonstration of ability, without specification of physical or other required qualifications of the pilot:

For the Third-Class license, the pilot must keep a primary training glider or a secondary training glider in the air for thirty seconds in a flight straight down hill and give such other evidence to the examiners as they may require that he is competent to handle a simple glider under normal circumstances.

For the Second-Class license, the candidate must fly a primary or secondary training glider for one minute down hill, making a full right and a full left or "S" turn.

For the First-Class license, the candidate may enter any type glider and must fly for five min-

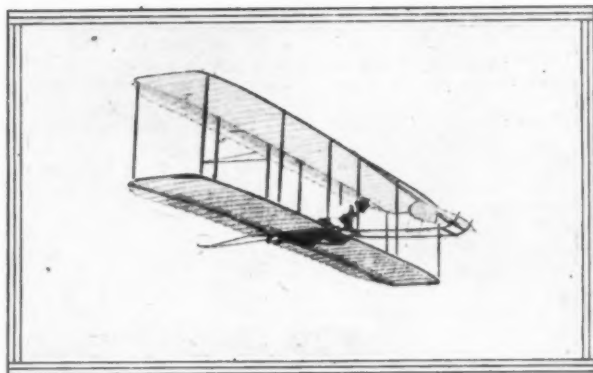


A Wright glider of 1911 vintage which set a record at the time with a control system similar in many ways to those used at present

—courtesy Smithsonian Institute

An early Wright glider, constructed in 1902, is shown here. It was equipped with a system of manual controls so that the pilot was able to lie down instead of hanging. In this way the parasite resistance was considerably reduced

—courtesy Smithsonian Institute



utes at an altitude higher than the starting point.

A Third-Class license is required before the second test may be given, and the Second-Class license must be shown by candidates for the First-Class license. Examinations may be given by any authorized National Glider Association contest committee.

The subject of gliders is of maximum interest to model builders.

By building glider models, you may hit upon an idea which will become an epochal development in aviation.

The September issue of MODEL AIRPLANE NEWS will be on all news stands August 23rd. Price 15 cents a copy.

You can't afford to miss this!

Macfadden Aviation Advisory Board

(Continued from page 38)

the Caterpillar Club a total of 225 names and 236 jumps, the repeaters being Colonel Charles A. Lindbergh with four jumps, Major James Rutledge, Lieuts. Eugene H. Barksdale (deceased), James T. Hutchison, Captain Frank O'D. Hunter, Sergeant Fred P. Miller, Messrs. Al Wilson, Harry Sievers and Ernest E. Dryer with two jumps each.

A new record in the annals of the club was created on May 2, when six candidates were simultaneously initiated. This rather unusual event took place some ten miles south of Fresno, Calif.

Lieut. Warren A. Maxwell, Air Corps, of March Field, Riverside, Calif., with seven enlisted men as passengers, was flying a Transport plane and cruising along at an altitude of 2,000 feet when the propeller of the right-wing motor was shattered. A piece of the broken propeller tore a gaping hole in the wing surface.

According to press reports, Lieutenant Maxwell ordered the men to jump and all but one did so from an altitude of about 1,200 feet and reached the ground safely. Staff Sergeant J. H. Arthur apparently chose to remain with the ship and he watched Lieutenant Maxwell bring the crippled transport down in a semi-crash landing, from which both miraculously escaped without injury.

—O—

Below is continued our list of World War Aces:

British—(living)

Major William G. Barker, V. C.	
Killed in crash March 12, 1930.	
(official) ..	52
(unofficial) ..	68
Capt. Philip F. Fullard ..	48
Capt. Robt. A. Little ..	47
Capt. G. E. H. McElroy ..	46
Capt. Henry W. Wollett ..	43



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1/2" x 3" x 36"	— .35	" "
1/2" x 6" x 36"	— .68	" "

(ADD 15c extra for packing charge on sheet orders of less than \$1.00. If sheet is ordered with plank omit this extra charge)

1" x 6" x 36"	— .75	per plank
2" x 6" x 36"	— 1.00	" "
2" x 3" x 36"	— .80	" "
3" x 3" x 36"	— 1.00	" "

(special bundles of 25 strips)

1/8" x 1/8" x 36"	— .60	per bundle
1/4" x 1/4" x 36"	— 1.25	" "
1/8" x 3/8" x 40"	— 1.50	" "
(the 1/8" x 3/8" sizes are twin-pusher sticks)		

IMPORTANT !!

ADD 15c extra to orders from Canada and West of the Mississippi NO FOREIGN Coin or Postage stamps accepted. Make all payments to

A. A. C. Model Aircrafters
DEPT. M.

4719 Third Avenue, N. Y. C.

(Send 2c stamp for complete balsa wood and model airplane supplies price list. DEALERS WRITE FOR SPECIAL RATES.)



GLIDER MODEL

Wing spread 42 inches. Controlled from ground, flies at great height. Not necessary

to throw your arm out. Blueprints 25c coin. Circular on request.

Speedee Model Co., P.O. Box 80, Jamaica, N. Y.

Free Rubber Strand

Send us a stamped envelope bearing your correct return address for a free two foot sample of our 1/8" CONTEST RUBBER STRAND. Use a double winder and test this sample for breakage against any other two foot length of 1/8" rubber motor on the market. Then compare our price of two feet per cent. Fair enough isn't it? See our list of bargains on page 50.

COUNTRY CLUB AERO SUPPLY COMPANY
59th & Holmes Sts., Kansas City, Mo.
"Where your dollar has more cents"

U.S. MODEL AIRCRAFT CORP.

Est. 1909

Just



Out

The Models to Win your Contest

CURTISS FALCON MILITARY OBSERVATION BIPLANE, Span 23½ inches. Weight 1½ oz. Construction Kit with full size drawing and Building instructions. Price Post Paid\$12.25

BARLING N. B. No. 3 World Record Holder Low Wing Monoplane. 24 in. span. Construction Kit with full size drawing and instructions. Price Post Paid.....\$3.25

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Graf Zeppelin Construction Kit 55½ inches\$7.50

Bellanca Construction Set\$9.60

Fokker Construction Set\$4.50

56 Page Catalog illustrating 24 additional flying and Exhibition Models and complete line of Model Supplies; send 10 cents for copy.

U. S. MODEL AIRCRAFT CORPORATION
397-99M Bridge Street, Brooklyn, N. Y.

ACTUAL INSIDE STORIES OF 20 GREAT CRIME MYSTERIES

Tales with the added thrill of truth—written by the world's leading detectives and reporters. There are 20 complete stories in this one volume entitled "Strange and Mysterious Crimes." Send us only \$2.00 and this masterful book goes to you without delay or further expense.

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New RANGER Models now ready for delivery direct from our factory. Astonishing new prices and terms. Do not buy until you see them.

RIDER AGENTS WANTED to ride and exhibit sample. Save big money. Many models, styles, wheels, lamps, horns, equipment at half usual prices. Easy Payments.

Write for our marvelous prices and terms.

Mead CYCLE COMPANY
DEPT. C-170 CHICAGO



LOOKOUT

commercial model is an easily constructed, square fuselage, cabin ship. Kit contains all necessary parts including ready cut ribs, with clear drawings and directions for assembling. No previous model building experience necessary. Send money order (no stamps) \$1.50 Postpaid.

JUSTIN W. BROWN

206 Poplar St. Chattanooga, Tenn.

NEW WAYS TO WIN MODEL CONTESTS

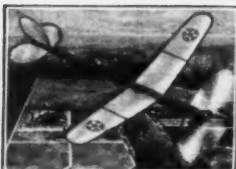
Broadfield offers Model Builders short cuts in Model Construction and new materials for making finer contest models. Broadfield handles many parts and supplies no others have.

SPECIAL OFFER

Send 25c in stamps, or coin for Handy Razor Knife and a New Broadfield, 44 page Model Aeroplane Catalog, one of the finest and most complete ever printed.

For promptness in answering this advertisement, you will receive a special 25c assortment of Balsa Wood free.

BROADFIELD AEROPLANE CO.
22 Yale Street, Hempstead, New York.



Sensational!
The METEOR FLIES 3000 FEET!
ONLY \$2.50

Thrilling 3000-foot flight! Loop the loop, barrel rolls, circular flights, etc. Finest and longest flying model ever made. Light, sturdy construction permits exciting, record-breaking flights impossible with heavy models.

Spread 28". KNOCKED DOWN—easy to assemble—all materials and instructions furnished. No tools needed—\$2.50. ASSEMBLED READY TO FLY—beautifully decorated in yellow and red—\$2.75. SEND NO MONEY! Just order METEOR today. Pay postman upon delivery.

KAHN AIRCRAFT COMPANY
5710 Woodlawn Ave. Dept. 28 Chicago, Illinois

Capt. J. I. T. Jones.....	40
Capt. A. W. B. Proctor.....	39
Major Roderic S. Dallas.....	39
Capt. F. R. McCall.....	34
Capt. Frank G. Quigly.....	34
Major Albert D. Carter.....	31
Capt. Cedric E. Howell.....	30
Capt. A. E. McKeever.....	30
Capt. W. L. Jordan.....	25
Capt. John Andrews.....	24
Capt. M. B. Frew.....	23
Capt. John Gilmour.....	23
Capt. Burden.....	22
Capt. A. H. Cobby.....	21
Lieut. John J. Malone.....	20
Lieut. Allen Wilkenson.....	19
Capt. E. G. McLaughley.....	19
Capt. P. C. Carpenter.....	15
Lieut. Clive Warman.....	15
Lieut. Fred Libby.....	14

(To be continued)

Other questions are answered as follows:

Dear Sirs:

What kind of glue is used to glue the wing covering to the ribs, leading edge, etc. Is it necessary to glue the covering at all? I should think this would cause wrinkles in the covering when the dope is applied to the wing.

What is the gliding ratio for the average primary glider?

How would basswood do for ribs if they were cut from a solid piece of wood of 1/4" thickness and then cut or hollowed to leave about 1/2" strip around the edge, with bracings and all, the whole being of a single piece of wood?

What is the average loading of a primary glider to the square foot of wing surface, including in this the weight of the pilot?

Yours truly,

VICTOR VOSS,
Garber, Iowa.

Answer:

We would recommend David's

Paste for gluing purposes and for the covering.

The average gliding ratio for a primary glider is 22 to 1.

Woods ordinarily used for ribs on gliders are birch, pine, spruce, elm and maple. We do not believe that basswood has been tried for this purpose.

The loading capacity of a primary glider as compared to the square foot of wing surface varies with the different gliders. In the case of the "Darmstadt" and "Geheimrat", German gliders, the wing loading is about 2.36 lbs. per sq. ft. The Cessna (U. S.) is about 2.1 lbs. per sq. ft., the Kassel (German) about 2.3 lbs. per sq. ft., the Waco (U. S.) about 2.1 lbs. per sq. ft. and the Bowlus (U. S.) about 2.0 lbs. per sq. ft.

Dear Sirs:

My father and I have had a heated argument as to what factors cause the tail of a plane to rise off the ground before the undercarriage does in a take-off. Will you please settle it?

Yours truly,

GORDON HOLBROOK,
9 Beach Street,
Maplewood, N. J.

Answer:

The fact that the tail of a plane rises off the ground before the undercarriage is due chiefly to the slipstream from the propeller; also the weight of the engine bearing on the landing gear, keeping the nose on the ground and the fact that the plane's normal line of flight is with the tail and nose horizontal to the ground. Hence, it must take its normal angle of flight before it can fly.

Gentlemen:

In Morengo, a small city here, about four or five people are going to buy a second hand airplane for about \$800 and want \$200 for a share in it. Their

Just Suppose . . . What Would You Do?

Suppose you had just married the nicest man in all the world and had decided to sally forth in quest of a place to call home. Suppose one day you came across the most adorable old house—an aged, neglected stepchild of a place, but it looked like the end of the rainbow to you and you bought it on the spot! Is that the end of the story? Oh, no. That's where the fun begins. You take the stuff your dreams have been made of, and scatter it about until that neglected old house begins to look young and pretty again and hugs you closely to its heart in warmest gratitude.

Once a young Lochinvar came out of the West and fell in love with a New Englander, and they found the home of their dreams in an old New England farmhouse. They turned it into a house of enchantment—a fascinating story, which they tell you in the August issue of YOUR HOME.

But suppose this was *your* story, and *you* were looking for practical ideas to weave into your dream-stuff for *your* home at the end of the rainbow. Would you seek the advice of some old fogey, as old-fashioned as the house itself? Wouldn't you turn instead to a friend of unquestionable taste, with up-to-the-minute ideas on decorating and furnishing? A friend who knows where to help you find the things to make that home just what you have always dreamed it would be, and will help you keep it so.

Such a friend is YOUR HOME, the magazine of friendly service, which each month is filled with suggestions and advice and helpful ideas for making out of any house, old or new, an enchanted haven—the end of your rainbow.

Know this magazine of friendly service for true home makers.

YOUR HOME, a Macfadden Publication. 25c a copy. All news stands July 23rd.

pilot has 125 hours flying time and will teach four or five to solo so that he can get his transport license. I wish you would advise me whether to buy a part in this or not.

Yours truly,
RAYMOND HOACH,
Williamsburg, Iowa.

Answer:

The problem you have before you is one that requires careful thought and consideration from every angle by one who is acquainted with the situation and the persons involved. We do not feel that we can take sides in an issue where money and investment is involved since we are so far removed from the actual circumstances and know so little about them, except the little that you tell us. We would suggest that you consult someone in your locality who knows the situation and the persons concerned.

Gentlemen:

What is a ground loop?

Is a tailless plane capable of as great a speed and altitude as a tail plane?

Can a pilot join the Marines without being military trained?

How long does it take to learn to fly?

How many hours of ground course work does the law require to be fit for air work?

Has any one yet invented a self-opening parachute?

What is the wing slot device?

Yours truly,

THOMAS TRAINER,
239 Lincoln Way East,
Chambersburg, Pa.

Answer:

A ground loop is a maneuver made by the pilot in order to avoid hitting a tree or a fence and is a reversal of position.

Experiments are being made at present to determine whether a tailless plane is capable of as great speed and altitude as a tail plane, but this has not yet been determined.

One need not have military training to join the Marines.

It depends greatly on the student as to the length of time required in learning to fly. Roughly, ten hours of solo flight are required of an applicant for a license of the private pilot class.

There is no specific law requiring a certain amount of ground work. All this is included in the course at flying schools. We would suggest that you write to the Department of Commerce, Aeronautics Branch, Washington, D. C., for their list of government approved schools. Upon writing to any one of these, you will secure definite data on the subject you are interested in.

There has been an invention made of a self-opening parachute.

A wing slot device might be termed an additional small "wing" along the leading edge of the plane.

LOWEST PRICES BALSA AND PRICES

Best grade Balsa. Specially cut and prepared for model use.	Any color dope 2 oz. can—25c.	round—5c for 10 in.
1" x 6" x 36".....\$1.75	Enough balsa, bass and reed for making Flying Glory—75c.	Aluminum sheets 34 and 40 gauge—25c per sq. ft.
2" x 6" x 36".....1.10	Bass 1/8 sq.—1/16 x 1/8 x 36"—4c a pc.	Amfibroid small tube 10c large—15c—2 oz. can—25c.
3" x 3" x 36".....1.10	5/32 sq. 1/8 x 1/4, 1/16 x 1/4	1/16, 1/8, 3/16, round reed, 6 ft.—3c.
1/16" x 1" x 36".....20	1/16 x 3/16 36"—3c a pc.	Japanese paper—24 x 20—10c.
1/16" x 1 1/2" x 18"—12 pcs.....50	Balsa prop blocks any size—1c per in.	35 x 13—12c. 20 x 33—15c.
1/16" x 4" x 18"—1 pc.....15	1/16 and 3/32 round wood 12"	Music Wire any size—1c per ft.
1/16" x 2" x 18"—1 pc.....09	long—12 pcs. 10c.	Bamboo 1/16 x 1/4 x 13—12 pcs.—10c.
1/16" x 1 1/2" x 18"—1 pc.....06	1/8 and 1/16 x 36" round wood—4c a pc.	5c service charge all orders less than \$1.00.
1/16" x 6" x 36".....32	1/8" flat rubber band 1c per ft.	3c packing charge on balsa over 18" length.
1/16" x 1" x 31".....10	30 ft.—45c.	10c postage east Mississippi, 15c west of Mississippi.
1/8" x 1 1/8" x 36".....60	3/16 Rubber 1 1/2c per ft. or 50 ft. 60c.	5c insurance if desired.
1/8" x 3/8" x 36".....1.50	Thinner 2 oz. can—25c.	
1/8" x 1 1/4" x 36".....1.25	3 ply veneer 20" x 30"—20c.	
1/8" x 1 1/4" x 36".....1.25	Aluminum rod 1/16 round and 1/8	
Full supply balsa. Bass any size.	Entirely new and different dummy motor—fits any plane.	
New light weight sponge rubber pneumatic tires for scale and flying models.	Lightest on market.	
Prices 1-1/2"—\$3.50 a pair, 1-3/4"—\$4.40 a pair, 2"—\$5.50 a pair.		

Crescent Model Aircraft Supply 1605 BENSON AVE., BROOKLYN, N. Y.

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Compare our Prices and Values	
Baby R.O.G. Kit, Plans Included.....\$.25	
Boeing Pursuit Kit, 20" Wing Span, with Plans.....1.50	
Oriole Contest Kit, 20" Wing Span, With Plans......85	
United Model Airplane and Supply Company	
1291 Clinton Ave., Irvington, N. J.	

NEW SCIENTIFIC WONDER
"X-RAY-CURIO"
10c 3 for 25c **BIG FUN**
BOYS You apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh.
FREE Pkg. radio picture films, takes pictures without camera. "You'll like 'em." 1 pkg. with each 25c order.
Marvel Mfg. Co., Dept. 93, New Haven, Conn.

MODEL AIRPLANE NEWS PLANS AND PARTS

THOSE who wish to purchase parts for the construction of models, or blueprints, will be furnished with the name and address of the company which stocks them, upon request for this information from the reader. Address the Editor, MODEL AIRPLANE NEWS, Macfadden Publications, Inc., 1926 Broadway, New York City.

POPULAR DEMAND forces us to continue our SPECIAL LOW PRICES

Satisfaction GUARANTEED on all orders of our high grade materials. Our Balsa is the best obtainable and does not contain ANY worm holes.

Rubber: 1/8" flat or .045 square Best grade Para rubber 75c a skein or 1/2c a foot. 210 ft. in a skein.

B+A+L+S+A

1/16 x 2 x 40" Balsa veneer 10c
1/8 x 1/8 x 40" 3 for 5c
1/8 x 3/16 x 40" 2 for 5c
1/8 x 1/4 x 40" 2 for 5c
1/4 x 3/16 x 40" 2 for 5c
1/4 x 1/4 x 40" 2 for 5c
Special 3/16 x 3/8 x 40" Twin Pusher Motor Sticks 2 for 5c
1/16 x 1/16 x 40" 3 for 5c
1/16 x 1/8 x 40" 3 for 5c
Celluloid wheels 2" assorted colors 20c a pair
Black Celluloid Radial Motors, 50c each
N. A. C. A. Celluloid cowlings, 25c each

IMPORTANT: No orders under 50c filled. Ten Cents packing charge must be included with all orders under \$1.00. Send 5c packing charge on all other orders. Free plans of tractor and pusher included in all orders.

SOUTHERN MODEL AIRPLANE SUPPLY COMPANY
259 Fifth Street, N. W., Atlanta, Ga.

HIGH GRADE MATERIAL

We are opening a new supply of materials suited for all model work. Various sizes of Balsa Wood, prop blocks, bamboo, rubber for motors, and a new transparent cement. The Midwest Tailplane construction set includes a motor to assemble and will secure you a Rocket Ship which will be of interest to all model builders. Ten cents will bring you a complete catalog containing the latest model supplies. Stamps not accepted.

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c/o Walter Smith 1247 East 102nd St. Cleveland, Ohio

LOCKHEED SIRIUS

2 Ft. flying scale model weighs 14 oz. Record flight of 104 seconds—R.O.W. Cont. set with blueprint, \$2.00 postpaid.

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2 Ft. flying scale model weighs 14 oz. Record flight of 86 seconds—R.O.W. Cont. set with blueprint, \$2.00 postpaid.

SIKORSKY AMPHIBION S-38

2 Ft. flying scale model weighs 14 oz. Record flight of 142 seconds—R.O.W. and 109 seconds R.O.W. Cont. set with blueprint, \$2.00 postpaid. Send for stamp for catalog.

BROOKLYN MODEL AIRCRAFT CO.
1326 Flatbush Ave. Brooklyn, N. Y.



3 Great Planes \$1

One Snipe Tractor, 19 in. wing, worth \$5c; 1 Baby R. O. G., 13 in. wing, worth \$5c; 1, 12 in. or 16 in. wing Glider, worth \$5c—all 3 kits complete \$1, postpaid. Big value.

Wander Glider, latest design, 16 in. balsa wings, a 20c real glider, instructions, kit, mailed for \$1.00. Glider, unusual value, complete, postpaid. 10c. Gliders popular now. Build and sell them.

Free Catalog and price list. Quality material for any model at lowest prices. Get into the contests! Our kits win them.
J. W. ALEXANDER & CO., Aircraft Div., 1129-2 Olive St., ST. LOUIS, MO.



HELP MEN FLY

TRI-STATE will train you for aeronautical engineering in 106 weeks. B. S. degree at end of the course. Prepare yourself for a well-paying position, get a college education in little more than half the usual time. All unnecessary subjects omitted. Intense concentration on mathematics, mechanics, and laboratory practice. Interesting work in Theory of Flight, Aerodynamics, Airplane Design, Airplane Structure and Airplane Engines. Students fitted for research, testing, design, manufacture, airport management, and saleswork. Basic training valuable in any branch of rapidly growing aeronautical industry.

Work in an atmosphere of self-reliance. Thorough instruction according to individual ability. No entrance examinations. Students who left high school can make up work. Living expenses and tuition low. Graduates hold responsible positions. 46th year. Enter in September, January, March and June. Write for catalog.

TRI-STATE COLLEGE

680 College Street, Angola, Indiana

WHERE else can you buy contest kits with carved balsa propellers at prices like these?

the NEW Selley GULL, 30" endurance tractor kit	\$1.65 Postpaid
the NEW Selley HERON, 30" twin pusher kit	\$2.15 Postpaid
the NEW Selley ALBATROSS, 38" twin pusher kit	\$2.65 Postpaid

Not to mention the two
Selley GLIDER
Scale Models



PRIMARY GLID- ER 38" wing span construction kit	\$1.15 Postpaid
ADVANCED GLIDER 42" wing span con- struction kit	\$1.65 Postpaid

Selley Supplies Make Better Models

Selley Adjustable Pitch Aluminum Propeller is light and *unbreakable*. 8", 60c; 10", 75c. Three-bladed, adjustable aluminum propellers: 8", \$1.00; 10", \$1.15. Four-bladed propellers, same: 8", \$1.25; 10", \$1.40. New—genuine Goodrich Silvertown balloon rubber tired aluminum wheels, 2" diameter; 40c each. Model-maker's Knife: safe, sharp, handy. Has razor blade folding into strong metal handle. 18c postpaid.

Selley Mfg. Co., Inc.
1379 Gates Avenue
Brooklyn, N. Y.

Pioneer Model Builders
Since 1909

Ask your dealer, or
send 5c for catalogue,
including *pictures*
and *full descriptions*
of these five NEW Sel-
ley models.

MODEL AEROPLANE SUPPLIES

Send 5c for bundle of Balsa and Price List
on Supplies.

AERO SHOP, 3650 Hurlbut Ave., Detroit, Mich.

BOYS

Only \$1.50 buys this "ORIOLE" kit with blue-
print. Easy to make. All balsa construction.
Weights ¼ oz. Has a 24 in. wing spread.
Flies over 3 min. R.O.G. at the average
height of 125 ft. Will fly indoors or outdoors.
No "DOPE" required on the "ORIOLE".
Shipment made same day as order is received.
Send money order, no stamps. Postpaid.
LINKE MODEL AIRCRAFT
80 East 235th St. New York, N. Y.

10" Balsa Spinner Propeller.....	75c
2" Balsa Wheels, per pair.....	25c
¾" Tail Rudder Wheel mounted, each.....	10c
Ball-Bearing 50c. mounted.....	50c
Hill-top Transparent Cornet Tubes.....	15c & 25c
Hill-top Clear Wing Dope, 3 ga. 1lb. 6 oz.....	25c

All prices postpaid. Free Price List and particulars on a Lock-
head Vega Model.

Stamps accepted under \$1.00.

Hill-Top Model Aircraft Co.
2553 Ring Place, Cincinnati, Ohio

AVIATION RINGS & PINS



No.2236 \$2.75

No.2552 \$1.00

No.2553 .85c

Special designs sent free of charge if you tell
us the name of your club. Samples sent for
inspection if your letter is approved by
instructor. You can order from above illus-
trations. Send for our 24-page Catalog of
Club and Class pins and rings.

C. K. Grouse Co., 71 Bruce Ave.
North Attleboro, Mass.

The American Sky Cadets

(Continued from page 37)

teachers, started to pour into Madison Square Garden when the doors were opened at 10:30 o'clock in the morning and continued throughout the day. A check showed that between 1,200 and 1,400 boys and girls passed through the giant Fokker F-32, the largest air liner in the show, each hour during the day. The popularity of other planes was easily as great, although no check of the number passing through the planes was made.

We wish on behalf of the boys and girls in general, to express special thanks to Messrs. Henderson and Johnson of the Aeronautical Chamber of Commerce for their ready co-operation and interest in helping toward the success of the contest.

Others we wish to thank are the donors of the prizes, the Commanding Officers of the 258th Field Artillery Armory, the Bronx; the 150th Field Artillery Armory, Brooklyn, and the 165th Regiment Infantry Armory in New York City, for the free use of their armories for the different contests.

Thanks are also due to the Curtiss-Wright Corporation and to the Curtiss-Wright Flying Services, to Mr. Fowler of the New York *Herald-Tribune*, Mr. Tichenor of *Aero Digest*, and Mr. Powell of *Aviation*, and to all the other aviation companies and to the aviators, who in many ways showed a practical interest in the boys and girls.

The list of Prize Winners is as follows:

SCALE MODEL

SENIOR

First—William Grunstra—Trophy Cup—Donated by Aeronautical Chamber of Commerce
Second—Alexander Dallas—Medal—Donated by Johnson & Co.
Third—Percival Gayle—Baseball Bat and Ball—Donated by Fleischmann Transportation Co., Balsa Box Dept.

JUNIOR

First—George Egner—Trophy Cup—Donated by American Sky Cadets
Second—Morton Nussbaum—Medal—Donated by Johnson & Co.

Third—Sam Daressky—Baseball Bat and Ball—Donated by Fleischmann Transportation Co., Balsa Box Dept.

COMMERCIAL MODELS

SENIOR

First—Thomas Boland—Trophy Cup—Donated by Abraham & Straus, Brooklyn
Second—Nick Trimarco—Medal—Donated by Johnson & Co.
Third—Cyril Green—Baseball Bat and Ball—Donated by Fleischmann Transportation Co., Balsa Box Dept.

JUNIOR

First—Joseph Kovel—Cup—Donated by Legion Air Cadets
Second—John Carman—Medal—Donated by Johnson & Co.
Third—E. Beshar—Baseball Bat and Ball—Donated by Fleischmann Transportation Co., Balsa Box Dept.

R. O. G. STICK MODELS

SENIOR

First—C. Goldberg—Trophy Cup—Donated by Avio
Second—Cyril Green—Medal—Donated by Johnson & Co.
Third—Florence Cascaden—Fountain Pen—Donated by Waterman Company

JUNIOR

First—J. McLaughlin—Trophy Cup—Donated by A. A. C. Model Aircrafters
Second—H. Lohden—Medal—Donated by Johnson & Co.
Third—Leon Greenstein—Baseball Bat and Ball—Donated by Fleischmann Transportation Co., Balsa Box Dept.

First Prize Girl Entry—Miss Florence Cascaden—Trophy Cup—Donated by Junior Aviation Club.
Second Prize Girl Entry—Miss Margaret McKillop—Kit—Donated by Grant Aircraft Co., Keene, N. H.

The Air Show Committee gave a free ticket to the show to each boy and girl who took part in the contest.

Plagiarism

Stories have been submitted to MODEL AIRPLANE NEWS which are copies of stories that have appeared in other magazines.

Anyone submitting a plagiarized story through the mail and receiving and accepting remuneration therefore is guilty of a Federal offense in using the mails to defraud.

The publishers of MODEL AIRPLANE NEWS are anxious—as are all reputable publishers—to stamp out this form of theft and piracy and are advising all magazines from which such stories have been copied of such plagiarism, and are offering to cooperate with the publishers thereof to punish the guilty persons.

Notice is hereby given to all who have submitted or who submit stories that the same must be ORIGINAL.



Wings for You!



Join the American Sky Cadets

The insignia of the American Sky Cadets—illustrated above—identifies the wearer as an air-minded chap who already knows something about the intricate and interesting problems of airplane design and construction and is rapidly learning more. For the American Sky Cadets is the most helpful organization of its kind in existence. If you are air-minded you should become a member and wear the handsome silver wings which every cadet receives free upon joining. And if you are promoted to the commission of Flight Commander or Squadron Commander, as you very likely may be, you can replace the silver wings with the gold wings which will be sent to you with your commission. Read what you get with your membership in addition to the insignia.

An Organization of Air-Minded Boys

The American Sky Cadets conduct City, State and National Contests for airplane model builders. Cups and medals are awarded to successful entrants. Every cadet is eligible to compete.

Free consultation with the Aviation Advisory Board is always available to each cadet. The Advisory Board will answer your questions and help you with construction difficulties.

Each Cadet receives, free, a MOSKITO air-

plane kit at the beginning of his membership.

Membership entitles you to twelve consecutive issues of **MODEL AIRPLANE NEWS**, the official magazine, which besides many thrilling stories of adventures in aviation, prints scale plans and other information of special interest to every model builder.

The first issue will arrive shortly after you have received your official membership card and the handsomely colored certificate of membership which is your authority to wear the wings without question.

Here is the opportunity you have been looking for! If you are interested in building and flying model airplanes, if you wish to learn airplane designing, if you wish to grow up to be a leader in this great industry of aviation, become an American Sky Cadet today! Join the leaders. Receive the latest scale plans each month. Accept expert guidance in building your models. Enter them in the official contests open only to American Sky Cadets. Learn the latest things of interest to model builders. Read the best, most thrilling stories about the romantic business of flying that are being published. All of these benefits are yours for less than the price of the magazine alone. Fill out the coupon, enclose \$1.50 and mail it to the Administrator, American Sky Cadets, 1926 Broadway, New York City, **TODAY!**

Dear Administrator:

I want to be an **AMERICAN SKY CADET**, because I am air-minded! I am enclosing \$1.50.

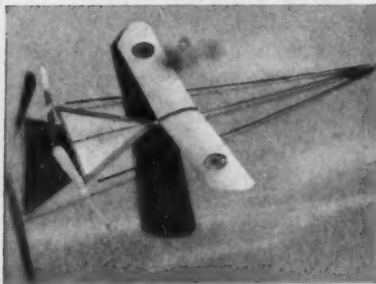
Name.....Age.....

Address..... City..... State.....

When I have obtained 10 more members please make me a Flight Commander and send me my gold wings to replace my silver ones.

Because We Want Every Boy

to have a Moskito Model we are passing on the benefit of these reduced prices made possible by our tremendous production



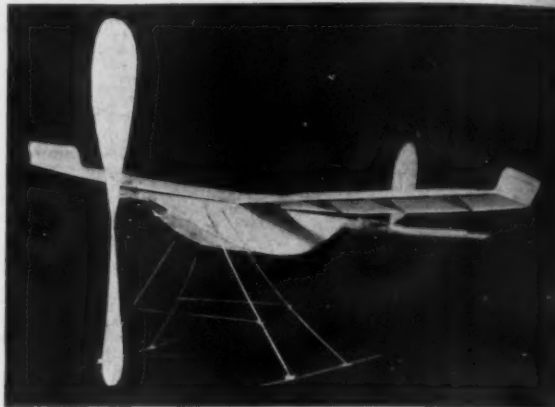
Enjoy Outdoor Sports, Fly a
TWIN PUSHER
\$2.25 Postpaid

Flies 10 minutes and many hundred feet. All balsa construction. Wing spread 30". Weight 2-3/4 oz.—can be lightened. You can be as sure the Moskito Twin Pusher will outfly any other model as you are that there will be a flame when you strike a match.

Most complete kit on market. Two blank balsa propellers—right and left—with kit. Free winder, dope, cement. Wire fitting all formed. Wing ribs cut to fit and wing curve proven. You'll get a \$100 worth of fun out of this \$2.25 model. Easy and simple to construct with full size layout sheet. If you want fun, this is your model.

MOSKITO SKIPLANE TANAGER—\$1.00 P. P.

This safety model, first shown at Buffalo Air Show is R.O.G., R.O.W., and will rise off snow or ice when properly equipped with wheels or pontoons. Can tow Baby R.O.G. (shown below) through the air. Duration of 1 1/2 minutes has been attained with this model. Will *not* dive, tailspin or ground loop because it uses newly



discovered safety principles. Complete kit contains bentwood prop, extra propeller blank, all wood cut to fit, cement, dope, fittings already made, etc. Also full size blueprints. Everything to make this amazingly stable, long flying, safety model, the best plane you ever built.

Read these Startling Prices

Orders less than \$.50 not filled

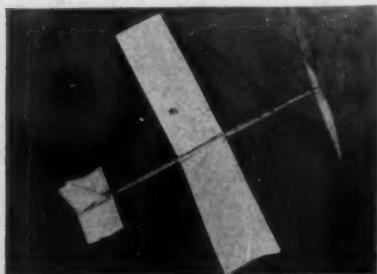
All prices postpaid

Large Tubes Aero Cement.....	.15 each
2 oz. bottles Aero Dope.....	.20 "
2 oz. bottles thinner.....	.20 "
Cement in Can—2 oz.....	.25 "
Small tubes cement.....	.10 "
Bottles Banana Oil with brush.....	.10 "
Sheets Japanese Tissue Paper 21 x 25".....	.05 "
Sheets Japanese Bamboo Paper 24 x 36".....	.14 "
Sheets Cellophane 12 x 24".....	.12 "
Sheets Three Ply Veneer 12 x 24".....	.30 "
Following strips of rubber in lengths of 25 and 100 feet—	
1/16 x 1/32".....	.01 per foot
1/16 x 1/16".....	.01 " "
1/8 x 1/8".....	.02 " "
1/8" flat.....	.01 " "
3/16" flat.....	.01 1/2 "
Pcs. No. 60 Drill Wire 36" long.....	.10 each
Piano Wire, 10 ft. rolls.....	.01 per foot
Spools of Steel Hair Wire.....	.10 each
Pcs. Flat Bamboo each 15" long.....	.02 "
Fittings—Envelopes containing the following—	
1 propeller hanger, 1 shaft, 1 small wing clip.	
1 large wing clip, 1 wire can, 1 rear hook, two washers, two bearings.....	.10 per pkg.

Winders.....	.30 each
Packages Aluminum Powder.....	.10 "
Washers.....	.10 per pkg.
Bearings.....	.10 " "
Propeller Blocks (Shaped) 6" long.....	.08 each
" " 7" ".....	.10 "
" " 8" ".....	.12 "
" " 9" ".....	.14 "
" " 10" ".....	.16 "
" " 11" ".....	.18 "
" " 12" ".....	.20 "
" " 16" ".....	.28 "
Bentwood Propellers 6" long.....	.12 "
" " 7" ".....	.14 "
" " 8" ".....	.16 "
" " 9" ".....	.18 "
" " 10" ".....	.20 "
" " 11" ".....	.22 "
" " 12" ".....	.24 "
" " 16" ".....	.32 "
Balsa Wing Rib Sets.....	.35 per set
Balsa Entering Edge Sticks.....	.10 each
Small Wheels.....	.02 "
Medium Wheels.....	.03 "
Large Wheels.....	.05 "

BABY R.O.G.—50c Postpaid

Sensation of Baltimore Aviation Show. Official Kit of American Sky Cadets. An actual unretouched photo of the Baby R.O.G. which made duration flight of four minutes before thousands of people. A sure contest winner. You must have one. Cannot be beaten at twice the price. Get it today—50c.



MOSKITO FLIER—\$1.00 Postpaid

Record Endurance model. Five minute flights or more easy with our special propeller and new kind of wing construction. Kit absolutely complete full sized layout. Free extra propeller. Wire fittings bent ready to use. Aero dope and cement. Balsa construction throughout. Adjustable for height or distance. Flies in small room or out of doors. Own a Moskito Flier—\$1.00 postpaid.



GET BOTH FOR \$1.25

U s e coupon below for this combination offer of Baby and Flier together for \$1.25. We may not repeat this offer again, so order today.

MOSKITO FLIER CO.
11 West 42nd St., New York City

Gentlemen:
Send me postpaid today: (mark article by X)
[] Money order enclosed.
[] Baby R.O.G. \$.50 [] Moskito Flier—\$1.00
[] Baby R.O.G. and Moskito Flier both—\$1.25
[] Moskito Tanager—\$1.00 [] Twinpusher—\$2.25
[] Moskito Cabin Transport—\$2.75

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